APPENDIX A

ANALYTICAL DATA FOR SNOWSHOE MINE SITE

Appendix A1 1993 Hazardous Material Inventory Analytical Data
Appendix A2 2002 Reclamation Investigation Analytical Data
Appendix A3 2004 Repository/Borrow Area Investigation Analytical Data

Appendix A1

1993 Hazardous Material Inventory Analytical Data

TABLE A1-1
SNOWSHOE MINE AND MILL SITE
TOTAL METALS in SOILS and SEDIMENT SAMPLE RESULTS
Hazardous Materials Inventory - August 1993

Sample ID	Sample Date	Sb mg/Kg	As mg/Kg	Ba mg/Kg	Cd mg/Kg	Cr mg/Kg	Ca mg/Kg	Cu mg/Kg	Fe mg/Kg	Hg mg/Kg	Mg mg/Kg	Mn mg/Kg	Ni mg/Kg	Pb mg/Kg	Ag mg/Kg	Zn mg/Kg
*27-005-SE-1	Aug-93	6.29 U	17 J	12.5	1.09	1.46	NA	10.1	15,700	0.04	NA	308	5.2	21	NA	46
*27-005-SE-2	Aug-93	32.2	1,350 J	6.45	**115**	1.78	NA	226	78,700	0.037	NA	4,580	5.4	8,320	NA	**9,270**
*27-005-TP-1	Aug-93	**109**	**3,840** J	4.91	**142**	1.58 U	NA	**664**	**98,200**	0.4	NA	1,150	2.93 U	**44,300**	NA	**11,700**
*27-005-WR-1	Aug-93	**120**	**3,230** J	7.58	**81.8**	1.73	NA	**545**	64,400	**1.11**	NA	1,120	6.16	**59,300**	NA	**6,530**
*27-005-BG-1	Aug-93	7.15 U	54 J	18.5	1.23	1.59 U	NA	29.4	21,400	0.061	NA	475	11.8	198	NA	213

U - Not Detected, J - Estimated Quantity.

B - Concentration greater than IDL but less than PQL.

Bold - 3x background concentration

NA - Not sampled

WR - Waste Rock

TP - Tailings Pile

BA - Borrow Area

BG - Background Sample

*- 1993 AMRB Hazardous Materials Inventory Analytical Results

*27-005-SE-1 Upstream of mine in Snowshoe Creek

*27-005-SE-2 Downstream of mine and most floodplain tailings

*27-005-TP-1 In floodplain near base of mine.

*27-005-WR-1

*27-005-BG-1

TABLE A1-2
SNOWSHOE MINE AND MILL SITE
ACID BASE ACCOUNTING RESULTS
Hazardous Materials Inventory August 1993

Sample ID	Sample Date	Sample Description	Total Sulfur %	Sulfate Sulfur %	Insoluble Sulfur %	Sulfide Sulfur %	Organic Sulfur %	Neut. Pot. t/1000t	T.S. AB t/1000t	T.S. ABP t/1000t	PyrS AB t/1000t	PyrS ABP t/1000t	SMP Buffer t/1000t	SMP Lime Requirements t/1000t	ABA Lime Requirements t/1000t	Total Requirement t/1000t	Lime Req. Dollhopf** (t/ac.) 1-ft
*27-005-TP-1	Aug-93	Tailings	1.62	0.09	NA	1.23	0.3	3.74	50.6	-46.9	38.4	-34.7					
*27-005-WR-1	Aug-93	Waste Rock	1.71	0.18	NA	0.55	0.98	15.5	53.4	-37.9	17.2	-1.67					

WR - Waste Rock
TP - Tailings Pile
BA - Borrow Area
BG - Background Sample
t/1000t - tons per 1,000 tons
**(t/ac.) - 1 ft. - tons per acre at a depth of 1 foot

TABLE A1-3
SNOWSHOE MINE AND MILL SITE
SURFACE WATER DATA
Hazardous Materials Inventory August 1993

Sample ID	Sample Date	Sample Description	Sb µg/L	As µg/L	Ba µg/L	Cd µg/L	Ca µγ/Λ	Cu µg/L	Cr µg/L	Co µg/L	Fe µg/L	Pb µg/L	Mg µγ/Λ	Mn µg/L	Hg µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg $CaCO_3$/L
27-005-SW1	Aug-93	Upstream of mine in Snowshoe Creek	30.7 U	0.987 J	2.97	2.57 U	NA	1.67	6.83 U	9.7 U	35.1 J	1.22 U	NA	4.08 U	0.18 JX	12.7 U	NA	7.57 U	39.1
27-005-SW2	Aug-93	Downstream of mine and most floodplain tailings	30.7 U	4.43 J	4.63	14	NA	2.77	6.83 U	9.7 U	45.2 J	60.7 J	NA	48.1	0.21 JX	12.7 U	NA	1,030 J	41.7
27-005-SW3	Aug-93	Discharge from PVC pipe from under WR4	30.7 U	9.06 J	4.47	61.5	NA	4.97	6.83 U	9.7 U	191 J	82.3 J	NA	175	0.22 JX	12.7 U	NA	5,940 J	98.5
Montana Numeric Water Quality Standards Human Health Standards Concentrations corrected for average hardness (28 mg/L CaCO)		Surface Water	6	18	2,000	5.0 H	NA	1,300	100	1,300 H	D	15 H	E	NA	0.05	100 H	100 H	2,000 H	NA
		Chronic Concentration (ug/L)	NA	NA	NA	0.105	NA	3.14	NA	NA	NA	0.63	NA	NA	NA	17.77	NA	40.75	28

U - Not Detected, J - Estimated Quantity.

B - Concentration greater than IDL but less than PQL.

NA - Not Available or Requested

µg/Kg - Micrograms per Liter

D- The concentration of iron must not reach values that interfere with the uses specified in the surface and groundwater standards (17.30.601 et seq and 17.30.1001 et seq.) The Secondary Maximum Contaminant Level of 300 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.

E- The concentration of manganese must not reach values that interfere with the uses specified in the surface and groundwater standards (17.30.601 et seq and 17.30.1001 et seq.) The Secondary Maximum Contaminant Level of 50 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.

H - Concentration value based on hardness. No sample shall exceed these concentrations after corrected for hardness.

TABLE A1-4
SNOWSHOE MINE AND MILL SITE
WET CHEMISTRY RESULTS & FIELD MEASUREMENTS
Hazardous Material Inventory August 1993

Sample ID	Sample Date	Sample Description	pH SU	TDS mg/L	Chloride mg/L	Sulfate mg/L	NO_3/NO_2 - N mg/L	SC µS/cm	Alk. mg/L $CaCO_3$	Temp °C	Flow Est. gpm
27-005-SW1	Aug-93	Upstream of mine in Snowshoe Creek	7.12	55	< 5	< 5	0.07	106	44	15.4	1,795
27-005-SW2	Aug-93	Downstream of mine and most floodplain tailings	7.36	53	< 5	8	0.1	133	43	16.9	10
27-005-SW3	Aug-93	Discharge from PVC pipe from under WR4	6.65	152	< 5	42	0.07	166	67	8.0	NM

NA* - Flow meter not functioning properly.
NM - Not Measured
mg/L - milligrams per Liter
SU - standard units
TDS - Total Dissovled Solids
mS/cm - microSiemens per centimeter
mg/L CaCO3 - milligrams per Liter calcium carbonate
gpm - gallons per minute

Appendix A2

2002 Reclamation Investigation Analytical Data

TABLE A2-1:
SNOWSHOE MINE AND MILL SITE SOURCE SAMPLING SUMMARY
JULY, 2002

SOURCE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	ABA	TCLP	AGRONOMIC	PHYSICAL
WASTE ROCK DUMPS									
Waste Rock Dump #1	WR1-1	0 - 0.5'	Light Brown, Silty clay, hard packed, with small rock, ~40% 6" minus.	WR1-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
			No subsurface sample collected due to inacessability by equipment, estimated depth ~ 2-feet. This dump is not traditionaly shaped but, is fan shaped; has been eroded by snowmelt and water.						
Waste Rock Dump #2	WR2-1	0 - 0.5'	Light Brown, Silty clay, hard packed, with small rock, ~50% 6" minus.	WR2-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
			No subsurface sample collected due to inacessability by equipment, estimated depth ~ 8-feet. Traditional shape with adit.						
Waste Rock Dump #3	WR3-1	0 - 0.5'	Light Brown, Silty clay, hard packed, with small rock, ~35% 6" minus	WR3-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
			No subsurface sample collected due to inacessability by equipment, estimated depth ~ 7-feet. Typical dump shape.						
Waste Rock Dump #4	WR4-1	0 - 0.5'	0-3" white silt "cap", 3"-6" reddish silty sand.	WR4-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 2'	Reddish silty sand.	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		2' - 4'	Black/gray silty clay.	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		4'	Native Soil.						
	WR4-2	0-4"	White silt "cap".	WR4-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
	WR4-2	4" - 10'	Dark brown silty gravel, with streaks of black, encountered wooden debris.	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
	WR4-3	0 - 0.5'	0-2" white silt "cap". Light brown/reddish silty gravel	WR4-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 14.5'	Light brown/reddish silty gravel	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		7'	Encountered lots of wooden debris.						
		14.5'	Encountered large rocks boulders/bedrock.						
	WR-4-4	0 - 0.5'	White Silt "cap". Moderatley vegetated.	WR4-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 15'	Light brown/reddish brown silty gravel ~2" minus, with occassional large boulder 12" minus.	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		3 - 7'	Wooden debris.						
	WR4-5	0 -0.5'	White silt "cap" ~ 8" in depth.	WR4-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 6'	Light brown/red silty gravel ~2" minus, with occasional large boulder 18" minus. Encounterd lots of wooden debris.	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		6 -9.5'	Silty clay topsoil, dark brown.						
	WR4-6	0 0.5'	0 -2" white silt "cap", very little vegetation.	WR4-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 11'	Light brown/reddish silty gravel ~25% 2" minus rock with occassional lage boulder 18" minus.	WR4-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
	WR4-7	0 - 0.5'	White silt "cap" `12" in depth, fair vegetation.	Not Sampled					
		0.5 - 10'	Light brown/reddish silty gravel with ~80% rock 2" minus, and occassional boulder 18" minus.	Not Sampled					

TABLE A2-1:
SNOWSHOE MINE AND MILL SITE SOURCE SAMPLING SUMMARY
JULY, 2002

SOURCE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	ABA	TCLP	AGRONOMIC	PHYSICAL
	WR4-8	0 - 0.5'	0-4" White silt "cap".						
		0.5 - 14'	Reddish silt, extremely rocky, ~95% 8" minus. Rock notably iron stained intermixed with yellowish rock.	WR4-8B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		14 - 15'	Silty clay topsoil.						
TAILINGS POND (Southside floodplain)									
	TP1-1	0 - 2"	Silty gravel, light brown.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		2" - 5'	Light brown silty gravel, well sorted, with occassional boulder 18" minus.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		5 - 7'	Large boulders, slightly rounded 24" minus.						
	TP1-2	0 - 0.5'	Reddish/brown gravel.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 4.5'	Reddish/brown gravel and rock intermixed with dark gray clayish tailings.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		4.5 - 6.5	Native ground, silty clay topsoil.						
		6'	Encountered ground water.						
	TP1-3	0 - 0.5'	Reddish gravel with silts. Distinct odor is present from test pit.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 6'	Reddish gravel and rocks with silts. Distinct odor is present from test pit.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		5'	Large amount of ground water flowing into test pit.						
	TP1-4	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 6'	Reddish/brown gravel and rocks with silts.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		4.5'	Large amount of ground water flowing into test pit.						
		6'	Large boulders, native soil?						
	TP1-5	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 - 6'	Reddish/brown gravel and rocks with silts.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		6 - 7'	Large boulders, native soil?						
		5'	Large amount of ground water flowing into test pit.						
	TP1-6	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 -3'	Reddish/brown gravel and rocks with silts.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		3 - 5'	Large boulders, native soil?						
		3.5'	Ground water flowing into test pit.						
			Waste boundary not well defined.						
	TP1-7	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 -4'	Reddish/brown gravel and rocks with silts.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		4 - 6.5'	Light gray silty clay tailings.						
		6.5 - 7'	Large boulders, native soil?						
		5'	Large amount of ground water flowing into test pit.						
	TP1-8	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 -5'	Reddish/brown gravel and rocks with silts. Intermixed with bright red, grey and yellow, soils.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		5 - 7'	Light grey/yellowish silty clay tailings.	TP1-8B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		7'	Large boulders, native soil?						
		5'	Large amount of ground water flowing into test pit.						

TABLE A2-1:
SNOWSHOE MINE AND MILL SITE SOURCE SAMPLING SUMMARY
JULY, 2002

SOURCE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	ABA	TCLP	AGRONOMIC	PHYSICAL
	TP1-9	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 -5'	Reddish/brown gravel and rocks with silts.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		5 - 9'	Light grey/yellowish silty clay tailings. Intermixed with boulders 12" minus.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		9'	Large boulders, native soil?						
		5.5'	Large amount of ground water flowing into test pit.						
	TP1-10	0 - 0.5'	Reddish gravel with silts.	TP1-1A	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		0.5 -7'	Reddish/brown gravel and rocks with silts.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		5 - 19' (+)	Light gray/yellowish silty clay tailings. Intermixed with boulders 12" minus.	TP1-1B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		19'	Excavation limit, did not encounter native soil.						
		5'	Large amount of ground water flowing into test pit.						
	TP1-11	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 10'	Reddish/brown gravel and rocks with silts.	Not sampled					
		10 - 19' (+)	Light gray/yellowish silty clay tailings. Intermixed with boulders 12" minus.	Not sampled					
		19'	Excavation limit, did not encounter native soil.						
		3'	Large amount of ground water flowing into test pit.						
	TP1-12	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 6'	Reddish/brown gravel with silts.	Not sampled					
		6 - 14'	Gravel layer, intermixed with mine wastes	Not sampled					
		14 - 19' (+)	Light gray/yellowish silty clay tailings. Intermixed with boulders 12" minus.	TP1-12B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		19'	Excavation limit, did not encounter native soil.						
		6'	Large amount of ground water flowing into test pit.						
	TP1-13	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 5.5'	Reddish/brown/gray gravel with silts.	Not sampled					
		5.5 - 7.5	Gravel layer, intermixed with tailings.	Not sampled					
		7.5 - 11'	Encounterd large boulders, dark brown silty clay topsoil?						
		6'	Large amount of ground water flowing into test pit through gravel layer.						
	TP1-14	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 3'	Reddish/brown/gray gravel with silts. Intermixed with burnt wooden debris.	Not sampled					
		3 - 8'	Yellow/gray silty clay tailings.	Not sampled					
		8 - 10'	White/gray silty clay tailings						
	TP1-15	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 4'	Reddish/brown/gray gravel with silts.	Not sampled					
		4 - 6'	Gravel layer.						
		6 - 10'	Gray/white silty clay tailings.	Not sampled					
		10'	Encounterd large boulders, dark brown silty clay topsoil?						
		6'	Large amount of ground water flowing into test pit through gravel layer.						
	TP1-16	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 6'	Reddish/brown/gray gravel with silts.	Not sampled					

TABLE A2-1:
SNOWSHOE MINE AND MILL SITE SOURCE SAMPLING SUMMARY
JULY, 2002

SOURCE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	ABA	TCLP	AGRONOMIC	PHYSICAL
		6 - 10'	Gray/white silty clay tailings.	Not sampled					
		10'	Encounterd large boulders, Native material?						
		6'	Large amount of ground water flowing into test pit.						
	TP1-17	0 - 0.5'	Reddish gravel with silts.	Not sampled					
		0.5 - 3'	Reddish/brown/gray gravel with silts.	Not sampled					
		3 - 3.5'	Gray/white silty clay tailings.	Not sampled					
		3.5 - 4.5'	Dark brown silty loam topsoil with old roots present.						
		4.5 - 6'	Mine waste, Reddish/ brown gravels with silts.						
		6 - 10'	Yellowish silty clay with large boulders 12" minus. Native material?						
		6'	Large amount of ground water flowing into test pit.						
TAILINGS POND (Northside floodplain)									
	TP2-1	0 - 12'	Native material, subangular rocks with silts and sands.	Not sampled					
		10'	Encountered groundwater.						
	TP2-2	0 - 13'	Native material, subangular rocks with silts and sands.	Not sampled					
		6'	Large amount of ground water flowing into test pit.						
	TP2-3	0 - 9'	Native material, subangular rocks with silts and sands.	Not sampled					
		3'	Large amount of ground water flowing into test pit.						
	TP2-4	0 - 1'	Native material, subangular rocks with silts and sands.	Not sampled					
		1 - 2.5'	Mine waste, reddish/brown gravel with silts.	Not sampled					
		2.5 - 4'	Gray, silty clay tailings.	TP2-4B					
		4 - 6'	Mine waste, reddish/brown gravel with silts, intermixed with native material.	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		6 - 8'	Gray, silty clay tailings.	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		8 - 10'	Native material, subangular rocks with silts and sands.	Not sampled					
		2.5'	Large amount of ground water flowing into test pit.						
	TP2-5	0 - 3'	Mine waste, reddish/brown gravel with silts. Wooden debris present.	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		3 - 9'	Gray, silty clay tailings	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		9 - 11'	Mine waste, reddish/brown gravel with silts, intermixed with native material.	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		11 - 15' (+)	Gray, silty clay tailings.	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		15'	Excavation limit.						
		9'	Large amount of ground water flowing into test pit.						
	TP2-6	0 - 9'	Mine waste, reddish/brown gravel with silts.	TP2-4B	Table A2-2	Table A2-3	Table A2-4	Table A2-5	Table A2-6
		9 -12'	Topsoil, silty clay loam.						
		12'	Encountered large rocks and boulders.						
		9'	Large amount of ground water flowing into test pit.						
BORROW AREA									
	BA1-1	0 - 1'	Dark brown, silty loam topsoil, large quantity of organics present.	BA1-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		1 - 6'	Dark brown silt, with ~30% rock 4" minus, with occasional large boulder 8" plus. Becoming rockier at depth.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		6 - 11'	Light brown/yelow silt, with ~45% rock 6" plus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		11'	Excavator refusal, large rock/bedrock.						

TABLE A2-1:
SNOWSHOE MINE AND MILL SITE SOURCE SAMPLING SUMMARY
JULY, 2002

SOURCE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	ABA	TCLP	AGRONOMIC	PHYSICAL
	BA1-2	0 - 1'	Dark brown, silty loam topsoil, large quantity of organics present.	BA1-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		1 - 7'	Dark brown silt, with ~50% rock 12" plus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		7 - 10'	Light brown/yelow silt, with ~45 - 50% rock 12" plus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		10'	Excavator refusal, large rock/bedrock.						
	BA1-3	0 - 0.5	Dark brown, silty loam topsoil, large quantity of organics present.	BA1-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		0.5 - 4'	Dark brown silt, with ~ 90% rock slabs 12" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		4 - 9'	Light yellow silt, with ~ 90% rock slabs 12" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
	BA1-4	0 - 1'	Dark brown, silty loam topsoil, with ~ 15% rock 2" minus.	BA1-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		1 - 8'	Light brown silt, with ~ 60% slaby rock 6" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		8 - 13'	Yellow/light brown silt, with ~90% slaby rock 12" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
	BA1-5	0 - 3"	Organic layer, no topsoil, root zone down to ~1.5'.	BA1-1A	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		3" - 5'	Light brown silt, with wooden debris. Rock estimated at ~ 60% 3" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		5 - 10'	Light brown/yellow silt, with ~75 - 80% rock 14" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		9.5'	Groundwater entering test pit.						
	BA1-6	0 - 4"	Dark brown silty loam topsoil.	Not sampled					
		4" - 5'	Light brown/yellow silt, with ~90% rock 24" minus.	BA1-5B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		5'	Excavator refusal, due to ledge rock.						
	BA1-7	0 - 3'	Encountered rock ledge.	Not sampled					
		8 - 13'	Yellow/light brown silt, with ~90% slaby rock 12" minus.	BA1-1B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		7'	Groundwater entering test pit.						
	BA1-8	0 - 1	Dark brown silty loam topsoil.	Not sampled					
		1 - 5'	Light brown silt with ~ 15% rock 2" minus.	BA1-5B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		5 - 7'	Large rocks/rock ledge.						
	BA1-9	0 - 5'	Dark brown silty loam topsoil with <10% rock.	BA1-5B	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		5 - 11.5'	Light brown/yellow clay silt.	BA1-9C	Table A2-2	Table A2-3		Table A2-5	Table A2-6
		11.5'	Light brown/yellow clay/gravel.	BA1-9C	Table A2-2	Table A2-3		Table A2-5	Table A2-6
	BA1-10	0 - 4'	Dark brown, silty loam, with ~30 - 35% rock, 6" minus with occasional large boulder.	BA1-5B	Table A2-2	Table A2-3		Table B-5	Table A2-6
		4 - 10'	Light yellow/orange silty clay, with ~ 45% rock 12" minus, with occasional boulder 24" plus.	BA1-5B	Table A2-2	Table A2-3		Table B-5	Table A2-6
		9.5'	Groundwater entering test pit.						
	BA1-11	0 - 5'	Dark brown, silty loam, with ~80% rock, 4" minus with occasional large boulder.	BA1-5B	Table A2-2	Table A2-3		Table B-5	Table A2-6
		5 - 9'	Orange/darkbrown silt with ~ 40% rock 8" minus, with occasional boulder 24" plus.	BA1-5B	Table A2-2	Table A2-3		Table B-5	Table A2-6
	BA1-12	0 - 1'	Dark brown silty loam topsoil.	Not sampled					
		1 - 6'	Dark brown silt, with ~45% rock 8" minus.	BA1-5B	Table A2-2	Table A2-3		Table B-5	Table A2-6
		6 - 6.5	Yellow/gray silt, with large boulders 24" plus.	BA1-5B	Table A2-2	Table A2-3		Table B-5	Table A2-6
		5'	Groundwater entering test pit.						

TABLE A2-1:
SNOWSHOE MINE AND MILL SITE SOURCE SAMPLING SUMMARY
JULY, 2002

SOURCE	SAMPLE NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	ABA	TCLP	AGRONOMIC	PHYSICAL
	BA1-13	0 - 4'	Dark brown silt with ~50% rock 8" minus.	Not sampled					
		4 - 7'	Light gray/brown silty clay with ~80% rock 24" minus.	Not sampled					
	BA1-14	0 - 6'	Dark brown silt with ~30% rock 6" minus.	Not sampled					
		6 - 10'	Light brown/yellow silt, with ~ 40% rock 12" minus, becoming rockier at depth.	Not sampled					
	BA1-15	0 - 2'	Dark brown, silty loam topsoil, with <10% rock 2" minus.	Not sampled					
		2 - 6'	Light yellow/brown silt with ~ 70% rock 6" minus.	Not sampled					
		6 - 10'	Light brown silt with ~85% rock 18" minus.	Not sampled					
		10'	Encountered bedrock.						

TABLE A2-2
SNOWSHOE MINE AND MILL SITE
TOTAL METALS IN SOILS AND SEDIMENTS SAMPLE RESULTS
Reclamation Investigation July, 2002

Sample ID	Sample Date	Sb mg/Kg	As mg/Kg	Ba mg/Kg	Cd mg/Kg	Cr mg/Kg	Ca mg/Kg	Cu mg/Kg	Fe mg/Kg	Hg mg/Kg	Mg mg/Kg	Mn mg/Kg	Ni mg/Kg	Pb mg/Kg	Ag mg/Kg	Zn mg/Kg
BA1-1A	Jul-02	8.3 B	77	58.0	4.2	6.7	NA	35.8	24,700	0.045 B	NA	1,110	8.5	493	0.83 B	177
BA1-1B	Jul-02	9.1 B	33	33.5 B	0.89 U	7.6	NA	47.3	26,900	0.032 B	NA	1,170	11.4	122	0.73 U	128
BA1-5B	Jul-02	10.6 B	16	22.5 B	1.2	6.5	NA	39.3	16,700	0.026 B	NA	396	5.7 B	103	0.73 U	79
BA1-9C	Jul-02	5.8 B	23	39.6	0.87 U	6.1	NA	72.3	21,000	0.012 U	NA	541	12.9	116	0.71 U	106
TP1-1A	Jul-02	**44.9**	**3,150**	10.1 B	**80.2**	3.8	NA	287	77,100	0.28	NA	1,960	3.6 B	**17,800**	34.0	**5,860**
TP1-1B	Jul-02	22.4	834	20.7 B	**55.1**	2.8	NA	174	40,700	0.28	NA	1,790	12.7	4,920	10.1	**4,080**
TP1-8B	Jul-02	6.2 B	23	21.2 B	2.6	4.6	NA	27.2	18,700	0.013 U	NA	167	9.1	121	0.71 U	278
TP1-12B	Jul-02	6.9 B	9 B	47.5	0.87 U	5.1	NA	28.1	18,400	0.013 U	NA	593	12.7	47	0.71 U	96
TP2-4B	Jul-02	10.2 B	735	28.4 B	16.6	5.6	NA	120	29,700	0.012 U	NA	424	6.7 B	3,470	6.6	948
BG-1	Jul-02	6.3 B	99	38.7 B	0.88 U	3.3	NA	65.5	36,500	0.069	NA	1,470	11.3	441	1.0 B	213
BG-2	Jul-02	15.7	417	36.5 B	17.4	5.3	NA	68.7	30,000	0.30	NA	1,350	11.4	5,590	6.0	834
BG-3	Jul-02	8.9 B	44	48.8	4.0	6.6	NA	43.8	20,000	0.079	NA	1,040	8.5	808	0.72 U	546
BG-4	Jul-02	32.4	**2,280**	33.2 B	**58.8**	4.6	NA	**420**	60,700	0.43	NA	3,860	6.7 B	**16,300**	**36.6**	**3,230**
BG-5	Jul-02	7.7 B	119	102	6.8	5.2	NA	33.8	18,200	0.11	NA	1,140	11.4	1,710	1.8 B	512
WR1-1A	Jul-02	**202**	**5,920**	4.5 B	**58.4**	3.2	NA	**786**	**109,000**	**1.15**	NA	2,210	2.1 U	**78,400**	**186**	**7,410**
WR2-1A	Jul-02	**482**	118	9.7 B	**2570**	1.9	NA	**924**	40,300	**2.2**	NA	793	17.0	**198,000**	**189**	**81,700**
WR3-1A	Jul-02	**50.6**	**3,150**	9.9 B	33.0	1.9 U	NA	**418**	59,500	0.29	NA	1,050	3.4 B	**20,200**	**50.5**	**3,620**
WR4-1A	Jul-02	19.6	1,210	76.6	34.7	4.1	NA	231	41,500	0.19	NA	1,730	4.6 B	7,030	13.5	2,290
WR4-1B	Jul-02	**55.5**	**3,380**	13.7 B	**87.6**	2.7	NA	**392**	94,100	0.32	NA	1,430	2.1 B	**20,800**	**40.9**	**7,120**
WR4-8B	Jul-02	**155**	**10,100**	20.7 B	**220**	2.3	NA	**1290**	92,000	0.38	NA	794	2.1 U	**65,700**	**164**	**11,700**
27-005-SE1	Jul-02	48.5	5,650	8.4 B	53.7	2.9	963	367	99,000	0.44	2,990	840 B	4.0 U	17,600	38.2	4,270
27-005-SE2	Jul-02	**51.1**	**2,850**	10.4 B	**136**	3.8	1,310	321	85,700	0.18	3,050	1,870	5.4 B	8,390	**23.9**	**11,300**
27-005-SE3	Jul-02	18.1	979	22.2 B	30.3	3.4	3,890	148	44,300	0.10	402	2,820	4.0 U	4,400	10.7	**2,850**
27-005-SE4	Jul-02	17.7	1,310	12.2 B	39.6	2.4	1,130	83.7	42,200	0.072	1,540	1,350	7.2 B	4,310	8.5	**3,290**
27-005-SE5	Jul-02	**109**	**7,290**	3.6 B	**350**	1.9 U	997	**588**	**124,000**	0.30	3,680	1,980	4.0 U	**16,200**	**52.8**	**28,200**
27-005-SE6	Jul-02	9.7 U	262	20.3 B	29.3	4.5	8,290	116	22,100	0.15	626	2,050	4.3 B	5,070	11.9	1,330
27-005-SE6b	Jul-02	28.7	755	11.4 B	**93.6**	2.9	2,040	157	34,100	0.11	1,860	1,640	5.7 B	4,510	12.0	**7,020**
27-005-SE7	Jul-02	**43.5**	**1,530**	6.5 B	**118**	2.9	754 B	**409**	72,700	0.12	3,500	1,410	3.9 U	9,070	14.7	**10,300**
27-005-SE8	Jul-02	9.3 U	12	26.1 B	0.9 U	3.2	2,820	8.2	14,500	0.054	750	2,600	4.0 U	30	0.71 U	52
27-005-SE9	Jul-02	23.3	1,110	8.5 B	40.3	3.7	1,030	160	45,200	0.23	2,360	1,410	4.0 U	6,900	11.7	**2,970**

U - Not Detected, J - Estimated Quantity.
B - Concentration greater than IDL but less than PQL.
Bold - 3x background concentration
NA - Not sampled
WR - Waste Rock
TP - Tailings Pile
BA - Borrow Area
BG - Background Sample

TABLE A2-3
SNOWSHOE MINE AND MILL SITE
ACID BASE ACCOUNTING RESULTS
Reclamation Investigation July, 2002

Sample ID	Sample Date	Sample Description	Total Sulfur %	Sulfate Sulfur %	Insoluble Sulfur %	Sulfide Sulfur %	Organic Sulfur %	Neut. Pot. t/1000t	T.S. AB t/1000t	T.S. ABP t/1000t	PyrS AB t/1000t	PyrS ABP t/1000t	SMP Buffer t/1000t	SMP Lime Requirements t/1000t	ABA Lime Requirements t/1000t	Total Requirement t/1000t	Lime Req. Dollhopf** (t/ac.) 1-ft
BA1-1A	Jul-02	Borrow Area	0.08	< 0.01	0.02	0.04	0.04	8.8	2.43	6.36	< 1.68	7.12	20.4	20	3.4	18.7	39.3
BA1-1B	Jul-02	Borrow Area	0.04	< 0.01	0.02	< 0.01	0.02	5.0	1.21	3.82	0.43	4.15	15.4	15	1.8	15.2	31.9
BA1-5B	Jul-02	Borrow Area	0.05	< 0.01	0.04	< 0.01	0.02	5.0	1.62	3.4	0.87	4.15	16.8	17	2.4	17.8	37.3
BA1-9C	Jul-02	Borrow Area	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	7.5	< 0.01	7.5	< 0.55	7.54	3.9	4	1.2	0.0	0.0
TP1-1A	Jul-02	Floodplains Tailings	1.03	0.19	0.04	0.65	0.15	86.7	32.16	54.56	21.29	65.4	3.2	3	30.7	0.0	0.0
TP1-1B	Jul-02	Floodplains Tailings	0.73	0.22	< 0.01	0.42	0.14	8.8	22.78	-13.97	13.17	-4.4	3.9	4	23.0	22.6	47.4
TP1-8B	Jul-02	Floodplains Tailings	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	28.9	< 0.01	28.88	< 0.55	28.9	0.3	0	1.2	0.0	0.0
TP1-12B	Jul-02	Floodplains Tailings	0.02	0.01	< 0.01	< 0.01	< 0.01	17.6	0.74	16.85	< 0.55	17.6	0.0	0	1.2	0.0	0.0
TP2-4B	Jul-02	Floodplains Tailings	0.26	0.13	< 0.01	0.11	0.01	7.6	8.08	-0.52	3.59	4.0	5.3	5	7.1	6.1	12.7
WR1-1A	Jul-02	Waste Rock	0.99	0.15	0.06	0.63	0.16	46.6	31.09	15.53	21.06	25.6	2.4	2	30.1	0.0	0.0
WR2-1A	Jul-02	Waste Rock	4.77	1.34	0.14	0.83	2.46	50.3	149.1	-98.85	29.24	21.0	0.3	0	138.6	110.8	232.7
WR3-1A	Jul-02	Waste Rock	0.42	0.1	0.05	0.23	0.03	3.8	13.01	-9.24	8.39	-4.6	3.9	4	12.0	15.2	31.9
WR4-1A	Jul-02	Waste Rock	0.47	0.16	0.15	0.12	0.04	26.4	14.7	11.69	7.13	19.3	5.3	5	13.4	0.0	0.0
WR4-1B	Jul-02	Waste Rock	1.6	0.3	0.15	0.77	0.38	1.3	50.12	-48.86	27.66	-26.4	19.7	20	47.7	82.6	173.5
WR4-8B	Jul-02	Waste Rock	2.83	0.12	0.41	1.64	0.66	13.8	88.5	-74.68	60.91	-47.1	16.8	17	87.5	113.1	237.5

WR - Waste Rock
TP - Tailings Pile
BA - Borrow Area
BG - Background Sample
t/1000t - tons per 1,000 tons
**(t/ac.) - 1 ft. - tons per acre at a depth of 1 foot

TABLE A2-4
SNOWSHOE MINE AND MILL SITE
SUPPLEMENTAL SAMPLING TCLP METAL RESULTS
Reclamation Investigation July, 2002

Sample ID	Sample Date	Sample Description	ug/L							
			As	Ba	Cd	Cr	Pb	Hg	Se	Ag
TP1-1A	Jul-02	Floodplains Tailings	32.1 B	167 B	542	10 U	**49,900**	0.17 B	57.2 U	3.7 U
TP1-1B	Jul-02	Floodplains Tailings	29.5 U	406	199	10 U	**15,000**	0.1 B	57.2 U	3.7 U
TP1-8B	Jul-02	Floodplains Tailings	29.5 U	189 B	76.4	10 U	453	0.19 B	57.2 U	3.7 U
TP1-12B	Jul-02	Floodplains Tailings	29.5 U	562	4.5 U	10 U	65.8	0.12 B	57.2 U	3.7 U
TP2-4B	Jul-02	Floodplains Tailings	29.5 U	307	59.9	10 U	1190	0.12 B	57.2 U	3.7 U
WR4-1A	Jul-02	Waste Rock	35.2 B	6.7 B	761	10 U	**45,700**	0.14 B	57.2 U	3.7 U
WR4-1B	Jul-02	Waste Rock	88.7	78.2 B	**3,440**	10 U	**64,100**	0.76	57.2 U	3.7 U
TCLP Maximum Allowable Concentrations µg/L			5,000	100,000	1,000	5,000	5,000	200	1,000	5,000

B - Concentration greater than IDL but less than PQL.
U - Not detected
Bold - Failed TCLP
ug/L - micrograms per liter

TABLE A2-5
SNOWSHOE MINE AND MILL SITE
SUPPLEMENTAL SAMPLING AGRONOMIC PROPERTIES
Reclamation Investigation July, 2002

SAMPLE ID	Sample Date	Sample Description	SATURATION PERCENTAGE %	ELECTRICAL CONDUCTIVITY (umhos/cm)	pH (SU)	ORGANIC MATTER %	CATION EXCHANGE CAPACITY (meq/100g)	NITRATE-N (ppm)	PHOSPHORUS P2 (ppm)	BICARBONATE P (ppm)	POTASSIUM (ppm)	RECOMMENDED FERTILIZER APPLICATION RATE				SODIUM ADSORPTION RATIO (SAR)
												NITROGEN (lbs / ac)	PHOSPHATE (P2O5) (lbs / ac)	POTASH (K2O) (lbs / ac)	MANGANESE (lbs / ac)	
BA1-1A	Jul-02	Borrow Area	63.7	232	4.59	5.9	10.7	11	77		118	30	-	25	30	0.45
BA1-1B	Jul-02	Borrow Area	58.8	71.8	4.84	6.1	2.2	3	54		41	40	25	35	45	0.72
BA1-5B	Jul-02	Borrow Area	84.2	67.6	4.79	6	1.4	2	19		23	40	35	35	45	1.04
BA1-9C	Jul-02	Borrow Area	48	41.8	5.69	0.5	1.9	1	53		17	45	20	35	37	0.71
TP1-1A	Jul-02	Floodplains Tailings	44.1	265	6.82	2.9	10.4	4	2		17	40	40	35	45	0.07
TP1-1B	Jul-02	Floodplains Tailings	46.8	221	6.89	2.4	7.5	2	13		20	40	40	35	45	0.08
TP1-8B	Jul-02	Floodplains Tailings	44.3	73.2	6.48	0.2	4.2	2	49		20	40	30	35	30	0.54
TP1-12B	Jul-02	Floodplains Tailings	52.6	486	7.57	0.4	3.4	2	30	3	32	40	45	35	-	0.19
TP2-4B	Jul-02	Floodplains Tailings	48	1,255	5.91	2	6.2	2	56		36	40	25	35	-	0.12
WR1-1A	Jul-02	Waste Rock	39.4	130	5.36	3.2	2.4	3	26		25	40	35	35	37	0.55
WR2-1A	Jul-02	Waste Rock	30.6	314	5.59	3.6	0.9	2	3		18	40	40	35	45	0.69
WR3-1A	Jul-02	Waste Rock	35	111	4.68	1.6	1.7	2	31		43	40	35	35	30	0.81
WR4-1A	Jul-02	Waste Rock	54	2,270	6.45	2.4	9.2	2	8		44	40	40	35	-	0.11
WR4-1B	Jul-02	Waste Rock	44.2	3,550	3.95	3.3	10.2	1	19		19	45	40	35	-	0.14
WR4-8B	Jul-02	Waste Rock	39.9	2,590	3.82	1.9	15.3	1	115		32	45	30	35	37	0.11

TABLE A2-6
SNOWSHOE MINE AND MILL SITE
SUPPLEMENTAL SAMPLING PHYSICAL PROPERTIES
Reclamation Investigation July, 2002

SAMPLE ID	SAMPLE DATE	SAMPLE DESCRIPTION	USDA TEXTURE	RAPID HYDROMETER Percent Course, Sand Silt and Clay				FIELD CAPACITY (1/3 Bar)	WILTING POINT (15 Bar %)	AVAILABLE MOISTURE (%)
				COARSE %	SAND %	SILT %	CLAY %			
BA1-1A	Jul-02	Borrow Area	Loam/Sandy Loam	44.5	52	40	8	40.50	25.32	15.18
BA1-1B	Jul-02	Borrow Area	Sandy Loam	58.7	50	44	6	37.17	16.54	20.63
BA1-5B	Jul-02	Borrow Area	Silt Loam	30.4	40	54	6	39.49	19.26	20.23
BA1-9C	Jul-02	Borrow Area	Silt Loam	32.8	30	56	14	32.30	14.86	17.49
TP1-1A	Jul-02	Floodplains Tailings	Sandy Loam	48.4	68	24	8	19.86	6.76	13.10
TP1-1B	Jul-02	Floodplains Tailings	Sandy Loam	43.5	60	32	8	27.14	9.26	17.88
TP1-8B	Jul-02	Floodplains Tailings	Silt Loam	15.5	28	62	10	22.32	4.65	17.67
TP1-12B	Jul-02	Floodplains Tailings	Silt Loam	0.2	2	78	20	38.68	6.90	31.78
TP2-4B	Jul-02	Floodplains Tailings	Silt Loam	34	32	54	14	35.32	28.72	6.60
WR1-1A	Jul-02	Waste Rock	Sandy Loam	50.1	70	18	12	21.69	8.82	12.87
WR2-1A	Jul-02	Waste Rock	Sandy Loam	53	72	18	10	14.23	4.17	10.06
WR3-1A	Jul-02	Waste Rock	Sandy Loam	50.3	68	22	10	13.80	6.20	7.60
WR4-1A	Jul-02	Waste Rock	Loam	30.1	42	40	18	32.92	11.45	21.47
WR4-1B	Jul-02	Waste Rock	Sandy Loam	48.2	62	28	10	23.98	9.49	14.49
WR4-8B	Jul-02	Waste Rock	Sandy Clay Loam	57.5	56	22	22	25.17	9.23	15.94

TABLE A2-7
SNOWSHOE MINE AND MILL SITE
SURFACE WATER AND GROUNDWATER DATA
Reclamation Investigation July, 2002

Sample ID	Sample Date	Sample Description	Sb µg/L	As µg/L	Ba µg/L	Cd µg/L	Ca µγ/Λ	Cu µg/L	Cr µg/L	Co µg/L	Fe µg/L	Pb µg/L	Mg µγ/Λ	Mn µg/L	Hg µg/L	Ni µg/L	Ag µg/L	Zn µg/L	Hardness mg $CaCO_3$/L
27-005-SW1	Jul-02	Upstream of mine in Snowshoe Creek	2.2 U	1 U	2.1 B	0.07 U	4,520 B	2.6 B	10 U	6.3 U	29.8 B	0.75 U	1,060 B	2.6 U	0.06 U	10.9 U	3.7 U	9.9 B	28
27-005-SW2	Jul-02	Downstream of mine and most floodplain tailings	2.2 U	1.3 B	2.2 B	4.1 B	5,590	2.4 U	10 U	6.3 U	10.8 B	14.1	1,390 B	2.6 U	0.06 U	10.9 U	3.7 U	231	20.8
27-005-SW3	Jul-02	Small seep from Adit #6 on WR4.	2.2 U	43.9	21.2 B	96	7,450	32.2	10 U	6.3 U	7,670	2160	2,420 B	2,470	0.06 U	10.9 U	3.7 U	5090	55.2
27-005-SW4	Jul-02	Approximately 715 feet downgradient of SW1	2.2 U	1 U	1.8 B	0.50 B	4,360 B	3.3 B	10 U	6.3 U	16.5 B	3.5	1,050 B	2.6 U	0.06 U	10.9 U	3.7 U	25.6	20
27-005-SW5	Jul-02	Approximately 1,200 feet downgradient of SW1	2.2 U	1.2 B	2.2 B	2.6 B	5,140	2.4 U	10 U	6.3 U	28.8 B	6.5	1,290 B	2.6 U	0.06 U	10.9 U	3.7 U	135	31
27-005-SW6	Jul-02	Collected upstream from a spring, on north side of Snowshoe Creek.	2.2 U	1.0 U	2.3 B	1.1 B	12,500	2.4 U	10 U	6.3 U	10 U	3.2	3,450 B	2.6 U	0.06 U	10.9 U	3.7 U	75.6	44
27-005-SW6b	Jul-02	Collected downstream from a spring, on north side of Snowshoe Creek.	2.2 U	1.5 B	2.4 B	1.4 B	15,000	2.4 U	10 U	6.3 U	26.8 B	7.8	4,520 B	7.7 B	0.06 U	10.9 U	3.7 U	126	60.8
27-005-SW7	Jul-02	Sample collected approximately 0.25 mile downstream of mine site, where Snowshoe Creek crosses the road.	2.2 U	2.7 B	2.5 B	6	5,650	2.4 U	10 U	6.3 U	12.8 B	20.8	1,470 B	4.4 B	0.06 U	10.9 U	3.7 U	349	28
27-005-SW8	Jul-02	Collected from seep on south side of Snowshoe Creek floodplain, within the tailings area.	2.2 U	2.2 B	2.6 B	20.8	4,260 B	3.3 B	10 U	6.3 U	25.6 B	22.4	914 B	2.6 U	0.06 U	10.9 U	3.7 U	948	20.4
27-005-SW9	Jul-02	Collected from seep on south side of Snowshoe Creek floodplain, within the tailings area.	2.2 U	4.2 B	3.7 B	11.3	3,380 B	4.9 B	10 U	6.3 U	179	59.5	807 B	23.8	0.06 U	10.9 U	3.7 U	588	20.4
27-005-SW10	Jul-02	Field Blank	2.2 U	0.96 U	0.90 U	0.03 U	15 B	2.4 U	10 U	6.3 U	12.1 B	0.59 U	40 U	2.6 U	0.06 U	10.9 U	3.7 U	11.3 B	<0.08
DISSOLVED METALS (ug/L)																			
27-005-GW3	Jul-02	Monitoring Well	7.4 B	427	72.2 B	26.5	7,230	NA	11	12.1 B	44,300	3,100	6,910	491	0.06 U	16.3 B	7.8 B	2380	24.4
GW1 FROM TP1-3	Jul-02	Groundwater from Test Pit	2.2 U	1.7 B	7.2 B	44.3	13,400	NA	10 U	6.3 U	26 B	41.5	1,670 B	546	0.06 U	10.9 U	3.7 U	4810	NA
GW2 FROM TP1-16	Jul-02	Groundwater from Test Pit	2.2 U	7.2 B	23.8 B	1.3 B	8,590	NA	10 U	6.3 U	524	16.4	2,990 B	417	0.06 U	10.9 U	3.7 U	80.6	NA
GW4 FROM TP1-16	Jul-02	Groundwater from Test Pit	2.6 B	7.6 B	22.3 B	1.5 B	8,180	NA	10 U	6.3 U	376	13.2	3,020 B	398	0.06 U	10.9 U	3.7 U	61.4	NA
Montana Numeric Water Quality Standards Human Health Standards	Jan-02	Surface Water	6	18	2,000	5.0 H	NA	1,300	100	1,300 H	D	15 H	E	NA	0.05	100 H	100 H	2,000 H	NA
Concentrations corrected for average hardness (28 mg/L CaCO)		Chronic Concentration (ug/L)	NA	NA	NA	0.105	NA	3.14	NA	NA	NA	0.63	NA	NA	NA	17.77	NA	40.75	28

U - Not Detected, J - Estimated Quantity.
B - Concentration greater than IDL but less than PQL.
NA - Not Available or Requested
µg/Kg - Micrograms per Liter

D- The concentration of iron must not reach values that interfere with the uses specified in the surface and groundwater standards (17.30.601 et seq and 17.30.1001 et seq.)
The Secondary Maximum Contaminant Level of 300 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.

E- The concentration of manganese must not reach values that interfere with the uses specified in the surface and groundwater standards (17.30.601 et seq and 17.30.1001 et seq.)
The Secondary Maximum Contaminant Level of 50 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.

H - Concentration value based on hardness. No sample shall exceed these concentrations after corrected for hardness.

TABLE A2-8
SNOWSHOE MINE AND MILL SITE
WET CHEMISTRY RESULTS & FIELD MEASUREMENTS
Reclamation Investigation July, 2002

Sample ID	Sample Date	Sample Description	pH SU	TDS mg/L	Chloride mg/L	Sulfate mg/L	NO_3/NO_2 - N mg/L	SC µS/cm	Alk. mg/L $CaCO_3$	Temp °C	Flow Est. gpm
27-005-SW1	Jul-02	Upstream of mine in Snowshoe Creek	7.62	19	< 5	< 5	< 0.05	20.5	20	19.4	NA*
27-005-SW2	Jul-02	Downstream of mine and most floodplain tailings	7.08	39	< 5	< 5	< 0.05	0.72	9	20.3	2,780
27-005-SW3	Jul-02	Small seep from Adit #6 on WR4.	3.72	98	< 5	60	0.37	2.1	-	21.5	NM
27-005-SW4	Jul-02	Approximately 715 feet downstream of SW1	7.83	27	< 5	< 5	< 0.05	46	22	17.1	3,354
27-005-SW5	Jul-02	Approximately 1,200 feet downstream of SW1	7.18	24	< 5	< 5	< 0.05	0.49	10	16	2,312
27-005-SW6	Jul-02	Collected upstream from a spring, on north side of Snowshoe Creek.	7.17	51	< 5	< 5	< 0.05	0.94	50	14.7	114
27-005-SW6b	Jul-02	Collected downstream from a spring, on north side of Snowshoe Creek.	7.57	47	< 5	< 5	< 0.05	1.06	26	11.9	107
27-005-SW7	Jul-02	Sample collected approximately 0.25 mile downstream of mine site, where Snowshoe Creek crosses the road.	7.20	13	< 5	< 5	-	0.49	35	15.6	NA*
27-005-SW8	Jul-02	Collected from seep on south side of Snowshoe Creek floodplain, within the tailings area.	6.38	27	< 5	< 5	< 0.05	0.44	25	15.4	60
27-005-SW9	Jul-02	Collected from seep on south side of Snowshoe Creek floodplain, within the tailings area.	6.42	22	< 5	< 5	< 0.05	0.29	16	13.2	26
27-005-SW10	Jul-02	Field Blank	5.93	20	< 5	< 5	< 0.05	0.04	8	27.1	NA
27-005-GW3	Jul-02	Monitoring Well	6.30	34	< 5	5	0.85	0.51	21	12.3	NA

NA* - Flow meter not functioning properly.
NM - Not Measured
mg/L - milligrams per Liter
SU - standard units
TDS - Total Dissovled Solids
mS/cm - microSiemens per centimeter
mg/L CaCO3 - milligrams per Liter calcium carbonate
gpm - gallons per minute

Appendix A3

2004 Repository/Borrow Area Investigation Analytical Data

TABLE A3-1
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
REPOSITORY/BORROW AREA TEST PIT AND SAMPLE SUMMARY

SOURCE	TEST PIT NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	Agronomic	Physical	ABA
REPOSITORY SITE A	REP-A-1N	0 - 1 ft	Reddish brown, silty loam topsoil, large quantity of organics present.	REP-A-North	Table A3-2	Table A3-3	Table A3-4	Table A-4
		1 - 4 ft	White/tan silt with few rocks approx. 10% 3-inch minus.					
		4 - 8.5 ft	Light brown/white silt, with approx. 10% rock 3 inch minus. Occasional boulder 24-inch plus.					
		8.5 ft	Excavator refusal, large rock/bedrock.					
	REP-A-2N	0 - 1 ft	Reddish brown, silty loam topsoil, large quantity of organics present.	REP-A-North	Table A3-2	Table A3-3	Table A3-4	Table A-4
		1 - 4.5 ft	White/tan silt with few rocks approx. 10% 3-inch minus.					
		4.5 - 8 ft	Silty clay, with occasional boulder 12-inch minus.					
		8 ft	Excavator refusal, large rock/bedrock.					
	REP-A-3S	0 - 1 ft	Reddish brown, silty loam topsoil, large quantity of organics present.	REP-A-South	Table A3-2	Table A3-3	Table A3-4	Table A-4
		1 - 4 ft	White/tan silt with few rocks approx. 10% 3-inch minus with occasional 6-inch minus cobble.					
		4 - 8.5 ft	White/tan silty clay with increasing clay content with depth.					
		8.5 ft	Excavator refusal, large rock/bedrock.					
	REP-A-4N	0 - 1 ft	Reddish brown, silty loam topsoil, large quantity of organics present.	REP-A-North	Table A3-2	Table A3-3	Table A3-4	Table A-4
		1 - 4 ft	White/tan silt with few rocks approx. 10% 3-inch minus.					
		4 - 8.5 ft	White/tan silty clay, <10% rock.					
		8.5 ft	Excavator refusal, large rock/bedrock.					
	REP-A-5N	0 - 1 ft	Reddish brown, silty loam topsoil, large quantity of organics present.	REP-A-North	Table A3-2	Table A3-3	Table A3-4	Table A-4
		1 - 3 ft	Silt, light brown, <10% rock 6-inch minus.					
		3 - 7 ft	Gray/tan silty clay moist.					
		7 ft	Excavator refusal, large rock/bedrock.					
	REP-A-6S	0 - 0.5 ft	Dark brown silty loam topsoil.	REP-A-South	Table A3-2	Table A3-3	Table A3-4	Table A-4
		0.5 - 2 ft	Light brown/tan silt, with <10% rock 1 inch minus, but with several large boulders 12-inch minus.					
		2 - 6.5 ft	Reddish brown silty clay (hardpan). Hard digging <10% rock 1-inch minus.					
		6.5 - 10.5 ft	Reddish brown silty clay with increasing clay content with depth. Hard digging <10% rock 1-inch minus.					
		10.5 ft	Excavator refusal.					
	REP-A-7N	0 - 1	Dark brown silty loam topsoil.	REP-A-North	Table A3-2	Table A3-3	Table A3-4	Table A-4
		1 - 4 ft	Light brown silt with <10% rock 1 inch minus with occasional 6-inch rock.					
		4 - 9.5 ft	Clay silt, clay content increases with depth.					
		9.5 ft	Excavator refusal, large rock/bedrock.					
	REP-A-8S	0 - 1 ft	Reddish brown, silty loam topsoil, large quantity of organics present.	REP-A-South	Table A3-2	Table A3-3	Table A3-4	Table A-4

TABLE A3-1
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
REPOSITORY/BORROW AREA TEST PIT AND SAMPLE SUMMARY

SOURCE	TEST PIT NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	Agronomic	Physical	ABA
		1 - 5 ft	Tan silt sand few rocks <10% 6-inch minus.					
		5 - 8 ft 2 inches	Tan/brown silt clay hard digging few rocks.					
		8 ft 2 inches	Excavator refusal (hardpan).					
	REP-A-9N		Test Pit excavated near large birch tree.	No Sample Collected.				
		0 - 1.5 ft	Silty loam topsoil.					
		1.5 - 3.5 ft	Tan/grey silty clay with approx. 15% rock up to 12-inch.					
		3.5 - 9 ft	Silty sand, tan/brown with cobbles and rock approx. 20%, 4-inch minus. Rockier and sandier soil than previous test pits on north side of road.					
		7.5 ft	Small amount of groundwater seeping into test pit.					
	REP-A-10N		Test pit located approx. 100 feet north of REP-A-9N. Few more birch trees, approx. 50 feet north west of this test pit location.	No Sample Collected.				
		0 - 1.5 ft	Silty loam topsoil with roots and organics.					
		1.5 - 6 ft	Tan/grey silt/clay with approx. 25% rock up to 12-inch diameter. Most rock 4-inch minus.					
		6 - 8 ft	Tan/brown silt/clay with few rocks 4-inch minus. Soil very tight, moderately hard digging.					
		5 ft	Small amount of groundwater seeping into test pit.					
	REP-A-11S			No Sample Collected.				
		0 - 1 ft	Silty loam topsoil with roots and organics.					
		1 - 4 ft	Tan silt/sand very few rocks <5%, relatively loose.					
		4 - 8 ft 4 inches	Tan/brown silt clay very hard digging, very few rocks <5%.					
	REP-A-12N	0 - 1 ft	Silty loam topsoil with roots and organics.	No Sample Collected.				
		1 - 3.5 ft	Tan/brown silty/clay with occassional large boulder 8-inch minus.					
		3.5 - 8.5 ft	Tan/brown silty/clay with occassional large boulder 8-inch minus. Very difficult digging.					
REPOSITORY SITE B	REP-B-1	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.	REP-B-Topsoil	NR	Table A3-3	Table A3-4	NR
		1 - 9 ft	Brown/tan silt with approx. 15% rock content 3-inch minus, with occassional large boulder (12-inch).	REP-B-East	Table A3-2	Table A3-3	Table A3-4	Table A3-5
		9 ft	Groundwater seep approx. 1 gph.					
	REP-B-2	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.	REP-B-Topsoil	NR	Table A3-3	Table A3-4	NR
		1 - 10 ft	Tan/white silt with some clay, from small clays seams, at 4 to 4.5 ft small gravel seam. Rock content <10% 1-inch minus.	REP-B-East	Table A3-2	Table A3-3	Table A3-4	Table A3-5
	REP-B-3	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.	REP-B-Topsoil	NR	Table A3-3	Table A3-4	NR
		1 - 6 ft	White silt with <10% rock.					

TABLE A3-1
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
REPOSITORY/BORROW AREA TEST PIT AND SAMPLE SUMMARY

SOURCE	TEST PIT NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	Agronomic	Physical	ABA
		6 - 11 ft	Reddish/orange clayey silt, <10% rock.	REP-B-East	Table A3-2	Table A3-3	Table A3-4	Table A3-5
		10 ft	Encountered groundwater approximately 0.5 gpm. The side of the test pit are unstable and collapsing.					
	REP-B-4	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.	REP-B-Topsoil	NR	Table A3-3	Table A3-4	NR
		1 -11 ft	Light brown/white silty sand with small gravel lenses, approx. 15% rock 1-inch minus with occasional large cobble 6-inch minus.	REP-B-East	Table A3-2	Table A3-3	Table A3-4	Table A3-5
		11 - 12 ft	Clay silt, encountered groundwater approximately 0.5 gph.					
	REP-B-5	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.	No Sample Collected.				
		1 -4 ft	White/tan silt with approx. 20% rock 6-inch minus.					
		4 - 5 ft	Reddish/brown clay lense.					
		5 - 7 ft	White/tan silt with approx. 20% rock 6-inch minus.					
		7 - 8 ft	Silty gravel with approx. 25% 1-inch minus rock. Groundwater entering test pit approx. <0.5 gpm.					
		8 - 10 ft 3 inches	Hard red clay with small gravels.					
	REP-B-6	0 - 2 ft	Reddish/brown silty loam topsoil with roots and organics.					
		2 - 5 ft	White/tan silt with approx. 25 to 30% rock 6-inch minus, with occasional large boulder (12-inch minus).	REP-B-North	Table A3-2	Table A3-3	Table A3-4	Table A3-5
		5 - 9 ft	Light brown clay/silt with approx. 10% rock 6-inch minus.					
		8 ft	Small groundwater seep, which dried up approx. 3 hours later.					
	REP-B-7	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.					
		1 - 4 ft	Light brown silt with approx. 50% 12-inch minus rock.					
		4 - 6 ft	Light brown silt with approx. 50% 6-inch minus rock.					
		5.5 - 6 ft	Encountered groundwater approx. 1 gpm.					
	REP-B-8	0 - 1 ft	Reddish/brown silty loam topsoil with roots and organics.					
		1 - 11 ft	Light brown silt with cobbles and boulders, approx. 60 to 70% 6-inch minus with occassional larger boulder (12-inch minus). Small gravel lenses intermixed with soil and rock.	REP-B-North	Table A3-2	Table A3-3	Table A3-4	Table A3-5
	REP-B-9	0 - 4 inches	Reddish/brown silty loam topsoil with some rock very little organics.	No Sample Collected.				
		4 inches - 11 ft	White/tan silty sand with 65 to 75 % rock 6-inch minus with occassional boulder. Rock content increases with depth.					
	REP-B-10	0 - 9 ft	Sandy/silt gravel with approx. 50% rock 3-inch minus.					
		9 - 13 ft	Light brown silt, moist, no rock. Side wall of test pit very unstable.	REP-B-South	Table A3-2	Table A3-3	Table A3-4	Table A3-5
	REP-B-11	0 - 2 ft	Reddish/brown silty loam topsoil with roots and organics.					
		2 - 11 ft	Silt/sand/gravel light brown approx. 40 to 50% rock 6-inch minus.	REP-B-South	Table A3-2	Table A3-3	Table A3-4	Table A3-5
		11 ft	Groundwater seeping into test pit.					

TABLE A3-1
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
REPOSITORY/BORROW AREA TEST PIT AND SAMPLE SUMMARY

SOURCE	TEST PIT NUMBER	SAMPLE DEPTH (ft)	DESCIPTION	Composite Sample I.D.	TAL	Agronomic	Physical	ABA
	REP-B-12	0 - 1.5 ft	Loamy topsoil with roots and organics.	No Sample Collected.				
		1.5 - 7 ft	Silt/sand/cobbles, light brown with +70% rock 4-inch minus intermixed with many boulders 12-inch plus.					
		7 ft	Bedrock, excavator refusal.					
	REP-B-13	0 - 1 ft	Topsoil silty loam with roots and organics. Area appears to be an old spring that is now dry.	No Sample Collected.				
		1 - 9.5 ft	Sandy silt white/tan with +70% rock 6-inch minus intermixed with few boulders 12-inch plus.					
	REP-B-14	0 - 1.5 ft	Topsoil silty loam with few small rocks, roots and organics.	No Sample Collected.				
		1.5 - 8.5 ft	White/tan silty sand with some gravels rock content is approx. 40% 3-inch minus mixed with approx. 20% 6-inch minus.					

gpm = gallon per minute

gph = gallon per hour

ft = feet

TAL = Target Analyte List (Total Metals)

NR = Analysis Not Requested.

Agronomic Parameters = Organic Matter Content, Nutrient Content and Fertilizer Recommendation, Cation Exchange Capacity, pH, Electrical Conductivity, Sodium Adsorption Ratio, and Saturation Percentage.

Physical Parameters = USDA Texture, Rapid Hydrometer, Field Capacity, Wilting Point, and Available Moisture.

ABA = Acid Base Accounting, Sulfur Fractions and SMP Buffering Capacity.

TABLE A3-2
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
SAMPLE RESULTS - TOTAL METALS

Sample ID	Sample Date	Sample Description	Sb mg/kg	As mg/kg	Ba mg/kg	Cd mg/kg	Cr mg/kg	Cu mg/kg	Fe mg/kg	Pb mg/kg	Mn mg/kg	Hg mg/kg	Ni mg/kg	Ag mg/kg	Zn mg/kg
REP-A-North	July-04	Composite sub-surface sample collected from Test Pits A-1, A-2, A-4, A-5 and A-7 located on north side of road.	5.1 U	12.8 B	92	3.1	10.5	22.5	22,500	23.8	414	0.02 U	10.8	0.78 U	42
REP-A-South	July-04	Composite sub-surface sample collected from Test Pits A-3, A-6, and A-8 located on south side of road.	5.2 U	16.1 B	113	2.9	12.4	25.1	24,400	30.1	468	0.03 U	14.9	0.8 U	43.5
REP-B-South	July-04	Composite sub-surface sample collected from Test Pits B-10 and B-11 located on the southern edge of the potential repository.	5.2 U	10.5 B	118	1.5 B	7.3	19.1	18,500	33.8	721	0.03 U	9.8	0.8 U	58.8
REP-B-EAST	July-04	Composite sub-surface sample collected from Test Pits B-1, B-2, B-3 and B-4 located on the eastern edge of the potential repository.	5.1 U	10.4 B	62.4	1.7 B	7.4	18.2	17,300	15 B	438	0.02 U	10	0.78 U	37.3
REP-B-NORTH	July-04	Composite sub-surface sample collected from Test Pits B-6 and B-8 located on the northern edge of the potential repository.	5.2 U	8.4 U	83.7	1.4 B	5.7	19.7	16,000	22.2	406	0.02 U	11.4	0.79 U	46.1

B - Concentration greater than the IDL but less than the PQL.
U = Not Detected
mg/kg - milligrams per kilogram
NA - Not sampled

TABLE A3-3
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
SAMPLE RESULTS - AGRONOMIC PROPERTIES

Sample ID	Sample Date	Sample Description	Organic Matter (%)	RECOMMENDED FERTILIZER APPLICATION RATE			Soil pH	Cation Exchange Capacity (meq/100g)	Sodium Adsoption Ratio (unitless)	Saturation Percentage (%)	Electrical Conductivity (µmhos/cm)
				Nitrogen (lbs/ac)	Phosphate (P_2O_5) (lbs/ac)	Potash (K_2O) (lbs/ac)					
REP-B-TOPSOIL	July-04	Composite topsoil sample from Test Pits B-1, B-2, B-3 and B-4.	2.02	45	20	30	5.76	5.6	0.89	65	39.8
REP-A-North	July-04	Composite sub-surface sample collected from Test Pits A-1, A-2, A-4, A-5 and A-7 located on north side of road.	0.1	50	25	40	5.4	4.0	0.68	33.9	29.7
REP-A-South	July-04	Composite sub-surface sample collected from Test Pits A-3, A-6, and A-8 located on south side of road.	0.35	50	30	40	5.83	5.8	0.92	34.3	73.4
REP-B-South	July-04	Composite sub-surface sample collected from Test Pits B-10 and B-11 located on the southern edge of the potential repository.	0.21	50	20	40	5.56	1.7	1	25.2	35.7
REP-B-EAST	July-04	Composite sub-surface sample collected from Test Pits B-1, B-2, B-3 and B-4 located on the eastern edge of the potential repository.	0.0	50	20	40	5.41	2.0	0.91	29.7	40.7
REP-B-NORTH	July-04	Composite sub-surface sample collected from Test Pits B-6 and B-8 located on the northern edge of the potential repository.	0.24	50	20	40	5.47	1.9	0.98	26.7	54.1

lbs/ac - pounds per acre
meq / 100 g - milliequivalence per 100 grams
umhos/cm - micromhos per centimeter

TABLE A3-4
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
SAMPLE RESULTS - PHYSICAL PROPERTIES

Sample ID	Sample Date	Sample Description	Sample Texture	Rapid Hydrometer Percent Coarse, Sand Silt and Clay				Field Capacity (1/3 Bar)	Wilting Point (15 Bar %)	Available Moisture (%)
				Coarse %	Sand %	Silt %	Clay %			
REP-B-TOPSOIL	July-04	Composite topsoil sample from Test Pits B-1, B-2, B-3 and B-4.	Sandy Loam/Silt Loam	8.3	46	50	4	30.7	10.0	20.7
REP-A-North	July-04	Composite sub-surface sample collected from Test Pits A-1, A-2, A-4, A-5 and A-7 located on north side of road.	Loam	51.1	48	40	12	25	6.6	18.3
REP-A-South	July-04	Composite sub-surface sample collected from Test Pits A-3, A-6, and A-8 located on south side of road.	Clay Loam	67.9	28	39	33	25	11.3	13.6
REP-B-South	July-04	Composite sub-surface sample collected from Test Pits B-10 and B-11 located on the southern edge of the potential repository.	Sandy Loam	55.4	63	27	10	15.6	2.5	13
REP-B-EAST	July-04	Composite sub-surface sample collected from Test Pits B-1, B-2, B-3 and B-4 located on the eastern edge of the potential repository.	Silt Loam	22.1	32	58	10	15.5	3.6	11.9
REP-B-NORTH	July-04	Composite sub-surface sample collected from Test Pits B-6 and B-8 located on the northern edge of the potential repository.	Sandy Loam	35.8	63	28	9	16.1	2.3	13.9

TABLE A3-5
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (PIONEER - 2004)
SAMPLE RESULTS - ACID BASE ACCOUNTING

SAMPLE ID	Sample Date	Sample Description	Total Sulfur %	Sulfate Sulfur %	Insoluble Sulfide S %	Sulfide Sulfur %	Organic Sulfur %	Neut. Pot. t/1000t	T. S. AB t/1000t	T. S. ABP t/1000t	PyrS AB t/1000t	PyrS ABP t/1000t	SMP Buffer (t/1000t)	SMP Lime Requirements (t/1000t)	ABA Lime Requirements (t/1000t)	Total Lime Requirement (t/1000t)	Lime Req. Dollhopf** (t/ac.) 1ft.
Rep-A-North	July-04	Composite sub-surface sample collected from Test Pits A-1, A-2, A-4, A-5 and A-7 located on north side of road.	0.00	0.00	0.00	0.00	0.00	1.2	0.00	1.23	0.00	1.23	3.20	3.20	0.00	**2.5**	**5.2**
Rep-A-South	July-04	Composite sub-surface sample collected from Test Pits A-3, A-6, and A-8 located on south side of road.	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	2.40	2.40	0.00	**3.0**	**6.3**
Rep-B-South	July-04	Composite sub-surface sample collected from Test Pits B-10 and B-11 located on the southern edge of the potential repository.	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	1.70	1.70	0.00	**2.1**	**4.5**
Rep-B-East	July-04	Composite sub-surface sample collected from Test Pits B-1, B-2, B-3 and B-4 located on the eastern edge of the potential repository.	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	1.00	1.00	0.00	**1.3**	**2.6**
Rep-B-North	July-04	Composite sub-surface sample collected from Test Pits B-6 and B-8 located on the northern edge of the potential repository.	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.00	0.00	0.00	1.00	1.00	0.00	**1.3**	**2.6**

NP = Neutralization Potential

AB = Acid Base

TS = % Total Sulfur

TS-ABP = Total Sulfur Acid Base Potential

PryS -ABP = Pyritic Sulfur Acid Base Potential

* = Tons of $CaCO_3$ equivalent per 1,000 tons of material

t/1,000t = Ton per 1,000 tons

**(t/ac) 1-ft = Ton per acre per 1 foot of soil

TABLE A3-6
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (MAXIM - 2004)
SUMMARY OF TEST PIT LITHOLOGY AND SOIL SAMPLE COLLECTION

Test Pit	Depth Interval (ft-bgs)	Description	% of Material < 3-inch minus (% volume)	% of 3 to 12 inch Material (% volume)	Sample ID
TP-1	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	na
	1-3	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	5-10	<1	TP-1 (1-3 ft)
	3-12.5	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and 2-3% cobbles in the 3-12 inch mius size range. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	2-3	TP-1 (3-12.5 ft)
TP-2	0-1	Reddish brown LOAM topsoil	<1	<1	TP-2 (0-1 ft)
	1-4	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	5-10	<1	TP-2 (1-4 ft)
	4-11	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	2-3 (generally < 6 inch minus)	TP-2 (4-11 ft)
TP-3	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	na
	1-4	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	10-15	<1	TP-3 (1-4 ft)
	4-12	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	2-3 (generally < 6 inch minus)	na
TP-4	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	na
	1-4	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	5-10	2-3 (generally < 6 inch minus)	na
	4-7.5	Light brown SANDT LOAM glacial till. Loosely consolidated. Hard digging with some large cobbles 12-20 inches in diameter.	5	5-10 (12-20 inch diameter cobbles)	na
	7.5-11	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	5-10	2-3 (generally < 6 inch minus)	TP-4 (Stockpile collected from material excavated from 7.5-11 ft interval)

Test pits excavated by Maxim Technologies on November 16 and 17, 2004

na - not applicable

bgs - below ground surface

Table from *Draft Site Investigation, Repository Site B-1 Snowshoe Mine and Snowshoe Creek Project - Technical Memorandum* (Maxim, 2004)

TABLE A3-6
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (MAXIM - 2004)
SUMMARY OF TEST PIT LITHOLOGY AND SOIL SAMPLE COLLECTION

Test Pit	Depth Interval (ft-bgs)	Description	% of Material < 3-inch minus (% volume)	% of 3 to 12 inch Material (% volume)	Sample ID
TP-5	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	na
	1-3	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	5-10	<1	na
	3-12.5	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	2-3	na
TP-6	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	TP-6 (0-1 ft)
	1-2	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	5-10	<1	TP-6 (1-2 ft)
	2-12.5	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	2-3	TP-6 (2-11 ft)
TP-7	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	TP-7 (Stockpile) composite material sample from stockpile
	1-2	Light brown SANDY LOAM glacial till. Loosely consolidated. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range. Shape ranges from subrounded to angular.	5-10	<1	
	2-11	Brownish yellow SILTY LOAM glacial till. Tightly consolidated with more silt content than shallower till. Poorly sorted rock content with approximately 5-10% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	2-3	
TP-8	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	na
	1-8	Brownish SILTY LOAM glacial till. Loosely consolidated with abundant cobbles. Aprroximately 25% cobbles in the 3-12 inch size range.Gravels are poorly sorted and range in shape from subrounded to angular.	10	25	na
	8-16.5	Brownish yellow SILTY LOAM glacial till with much less cobbles than 1-8 foot interval. Poorly sorted rock content with approximately 10-15% gravels in the 1-3 inch minus size range and some cobbles up to 6 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	15-Oct	<1	TP-8 (8-16.5 ft)
TP-9	0-1	Reddish brown SILTY LOAM topsoil	<1	<1	na
	1-14.5	Brownish yellow SILTY LOAM glacial till. Poorly sorted rock content with approximately 10% gravels in the 1-3 inch minus size range and 10-15% cobbles up to 12 inch minus. Gravels and cobbles are poorly sorted and range in shape from subrounded to angular.	10	10-15	na

Test pits excavated by Maxim Technologies on November 16 and 17, 2004

na - not applicable

bgs - below ground surface

Table from *Draft Site Investigation, Repository Site B-1 Snowshoe Mine and Snowshoe Creek Project - Technical Memorandum* (Maxim, 2004)

TABLE A3-7
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (MAXIM - 2004)
PHYSICAL PARAMETER RESULTS

Sample ID	Description	Physical Parameters				
		USDA Classification	Sand (%)	Silt (%)	Clay (%)	Coarse Fragment (%)*
TP-2 (0-1 ft)	Reddish brown LOAM topsoil	Loam	52	40	8	52
TP-6 (0-1 ft)	Reddish brown SILTY LOAM topsoil	Silt Loam	28	67	5	28
TP-1 (3-12.5 ft)	Brownish yellow SILTY LOAM glacial till	Silt Loam	33	60	7	33
TP-2 (1-4 ft)	Light brown SANDY LOAM glacial till	Sandy Loam	59	39	2	59
TP-2 (4-11 ft)	Brownish yellow SILTY LOAM glacial till	Silt Loam	37	56	7	36
TP-3 (1-4 ft)	Light brown SANDY LOAM glacial till	Sandy Loam	60	38	2	60
TP-4 (Stockpile)	Stockpile of material excavated from 7.5 to 11 ft bgs	Sandy Loam	54	43	3	54
TP-6 & TP-8 (1-16.5 ft)	Composite sample of subsoil excavated from TP-6 & TP-8	Sandy Loam	56	36	8	56
TP-7 (Stockpile)	Stockpile of material excavated from 1 to 11 ft bgs	Silt Loam	34	65	1	33

Samples collected from test pits excavated by Maxim Technologies on November 16 and 17, 2004

bgs - below ground surface

* Coarse fragment content indicates percent of sample retained ona No. 10 sieve on a weight basis.

Table from *Draft Site Investigation, Repository Site B-1 Snowshoe Mine and Snowshoe Creek Project - Technical Memorandum* (Maxim, 2004)

TABLE A3-8
SNOWSHOE MINE SITE - REPOSITORY SITE INVESTIGATION (MAXIM - 2004)
CHEMICAL PARAMETER RESULTS

Sample ID	Acid Base Accounting				Cations				Nutrients					
	Acid Potential (tons/1000 tons)	Acid/Base Potential (tons/1000 tons)	Neutralization Potential (tons/1000 tons)	Total Sulfur (%)	Calcium Sat. Paste (meq/l)	Magnesium Sat. Paste (meq/l)	Sodium Sat. Paste (meq/l)	Sodium Adsorption Ratio	Phosporus (mg/kg)	Organic Matter (%)	Potassium (mg/kg)	Nitrate+Nitrite (mg/kg)	EC Saturated Paste (mmhos/cm)	pH Saturated Paste (su)
TP-2 (0-1 ft)	<1	0.5	0.5	<0.5	0.35	0.16	0.22	0.43	<4	2.24	60	<0.5	0.09	5.2
TP-6 (0-1 ft)	<1	1.7	1.7	<0.5	0.30	0.16	0.22	0.45	<4	2.81	100	<0.5	0.09	5.6
TP-1 (3-12.5 ft)	<1	0.0	<0.5	<0.5	0.15	<0.08	0.30	0.89	<4	0.15	20	<0.5	0.06	5.0
TP-2 (1-4 ft)	<1	1.4	1.4	<0.5	0.20	<0.08	0.17	0.46	<4	0.27	40	<0.5	0.06	5.3
TP-2 (4-11 ft)	<1	1.0	1.0	<0.5	0.15	<0.08	0.22	0.64	<4	<0.1	30	<0.5	0.05	5.4
TP-3 (1-4 ft)	<1	0.0	<0.5	<0.5	0.25	0.08	0.48	1.17	<4	0.40	20	<0.5	0.12	4.7
TP-4 (Stockpile)	<1	0.5	0.5	<0.5	0.15	<0.08	0.35	1.02	<4	0.76	20	<0.5	0.07	5.4
TP-6 & TP-8 (1-16.5 ft	<1	0.5	0.5	<0.5	0.05	<0.08	0.17	0.68	<4	0.11	20	<0.5	0.03	5.3
TP-7 (Stockpile)	<1	0.5	<0.5	<0.5	0.15	<0.08	0.26	0.77	<4	0.25	20	<0.5	0.08	5.0

Samples collected from test pits excavated by Maxim Technologies on November 16 and 17, 2004

bgs - below ground surface

su - standard units

mmhos/cm - millimhos/centimeter

EC - Electrical Conductivity

meq/l - milliequivalents/liter in saturated paste

mg/kg - milligram/kilogram

Table from *Draft Site Investigation, Repository Site B-1 Snowshoe Mine and Snowshoe Creek Project - Technical Memorandum* (Maxim, 2004)

APPENDIX B

THREATENED AND ENDANGERED SPECIES AND PLANT SPECIES

TABLE 2
THREATENED, ENDANGERED, AND SENSITIVE PLANT, FISH, AND WILDLIFE SPECIES
POTENTIALLY PRESENT AT OR NEAR THE POTENTIAL REPOSITORY SITES FOR THE SNOWSHOE MINE, MONTANA

COMMON NAME	SCIENTIFIC NAME	MONTANA FISH WILDLIFE AND PARKS*	U.S. FISH AND WILDLIFE SERVICE*	KOOTENAI NATIONAL FOREST	COMMENTS
PLANTS:					
Oligotrichum Moss	*Oligotrichum aligerum*				Montana National Heritage Program - Species of Concern.
Hygrohypnum Moss	*Hygrohypnum cochlearifolium*				Montana National Heritage Program - Species of Concern.
Fir Pinwheel	*Radiodiscus abietum*				Montana National Heritage Program - Species of Concern.
FISH:					
No Fish Identified					
WILDLIFE:					
Gray Wolf	*Canis lupus*			Threatened	
Canada Lynx	*Lynx Canadensis*			Threatened	Montana National Heritage Program - Species of Concern.
Grizzly Bear	*Ursus arctos horribilus*			Threatened	
Wolverine	*Gulo gulo*			Sensitive	
Fisher	*Martes pennanti*			Sensitive	
Nothern Goshawk	*Accipiter gentiles*			Sensitive	
Coeur D'Alene salamander				Sensitive	
Townsend's Big-eared Bat	*Corynorhinus townsendi*			Sensitive	
Black-backed Woodpecker	*Picoides arcticus*			Sensitive	
Boreal Toad	*Bufo boreas boreas*			Sensitive	

* = Correspondence Pending

Species of Special Concern: Snowshoe Mine Reclamation Work Plan
Section 7, T28N, R31W, in Lincoln County

Scientific Name: FELIS LYNX

Common Name: LYNX

Global Rank G5

State Rank: S2

Forest Service status:

USFWS Endangered Species Act Status: LT

BLM Status:

Occurrence Type:

Species occurrence data:

POTENTIAL HABITAT. THIS OCCURRENCE RECORD CONSISTS OF LARGE CONTIGUOUS AREAS THAT WERE GENERALIZED FROM SPECIFIC HABITATS IDENTIFIED BY THE WILDLIFE SPATIAL ANALYSIS LAB AT THE UNIVERSITY OF MONTANA AS BEING POTENTIAL LYNX HABITAT.

Last observation: 1999 **Size (acres):**

General site description:

DENSE, MATURE OR OLD-GROWTH LODGEPOLE PINE, DOUGLAS-FIR, ENGELMANN SPRUCE AND SUBALPINE FIR FORESTS. WELL-DEVELOPED UNDERSTORY IMPORTANT.

Land owner/manager

Comments:

ALL HABITAT POLYGONS IN THE STATE ARE INCLUDED IN THIS OCCURRENCE RECORD. SOURCE DATA INCLUDES CAVEAT THAT SUITABLE HABITAT MAY BE OVERESTIMATED. SPRUCE-FIR FORESTS ABOVE 3500 FEET ELEVATION ARE PREFERRED HABITAT. LYNX NUMBERS CYCLE WITH NUMBERS OF SNOWSHOE HARE AND MAY BE VERY LOW FOR SEVERAL YEARS EVEN IN PREFERRED HABITAT. FOR THE ABOVE REASONS AND THE PRELIMINARY NATURE OF THE HABITAT MAPPING, THIS OCCURRENCE IS NOT DISPLAYED ON STANDARD MAPS OF ELEMENT OCCURRENCES.

Information source

HART, M. M., W. A. WILLIAMS, P. C. THORNTON, K. P. MCLAUGHLIN, C. M. TOBALSKE, B. A. MAXELL, D. P. HENDRICKS, C. R. PETERSON, AND R. L. REDMOND. 1998. MONTANA ATLAS OF TERRESTRIAL VERTEBRATES. UNPUBLISHED REPORT. MONTANA COOPERATIVE WILDLIFE RESEARCH UNIT, THE UNIVERSITY OF MONTANA, MISSOULA. VII + 1302 PP.

Survey site name: STATEWIDE

County: BEAVERHEAD; CARBON; CASCADE; DEER LODGE; FLATHEAD; GALLATIN; GLACIER; GRANITE; JEFFERSON; JUDITH BASIN; LAKE; LEWIS AND CLARK; LINCOLN; MADISON; MEAGHER; MINERAL; MISSOULA; PARK; PONDERA; POWELL; RAVALLI; SANDERS; SILVER BOW; STILLWATER; SWEET GRASS; TETO

USGS quadrangle: (EXTENDS OVER MULTIPLE QUADS)

Precision: G

Elevation (ft):

Location:

INCLUDES MUCH OF WESTERN & SOUTH CENTRAL MONTANA

Township\Range: **Section:** **TRS comments:**

Species of Special Concern: Snowshoe Mine Reclamation Work Plan
Section 7, T28N, R31W, in Lincoln County

Scientific Name: HYGROHYPNUM COCHLEARIFOLIUM

Common Name:

Global Rank: G4

State Rank: S1

Forest Service status:

USFWS Endangered Species Act Status:

BLM Status:

Occurrence Type:

Species occurrence data:
SPECIMEN COLLECTED.

Last observation: 1960-07-25

Size (acres):

General site description:
SPLASHED ROCKS AND SMALL WATERFALL FACES.

Land owner/manager
KOOTENAI NATIONAL FOREST, LIBBY RANGER DISTRICT; CABINET MOUNTAINS WILDERNESS

Comments:

Information source
BOTANIST, MONTANA NATURAL HERITAGE PROGRAM, 1515 EAST SIXTH AVENUE, HELENA, MT 59620-1800.

Survey site name: LEIGH CREEK

County: LINCOLN

USGS quadrangle: SNOWSHOE PEAK

Precision: G

Elevation (ft): 4200

Location:
LEIGH LAKE TRAIL.

Township\Range:	Section:	TRS comments:
028N031W	6	

MONTANA
Natural Heritage
Program

P.O. Box 201800 • 1515 East Sixth Avenue • Helena, MT 59620-1800 • fax 406.444.0581 • tel 406.444.3009 • http://MTNHP.ORG

August 23, 2004

Marty Bennett
Pioneer Technical Services, Inc.
P.O. Box 3445
Butte, Montana 59702

Dear Marty,

I am writing in response to your request for information on plant and animal species of special concern in the vicinity of the Snowshoe Mine Reclamation Project, Section 7, T28N, R31W, Lincoln County. We checked our databases for information in this general area and have enclosed 5 species of concern reports, one map and explanatory material.

Please keep in mind the following when using and interpreting the enclosed information and maps:

(1) These materials are the result of a search of our database for species of concern that occur in an area defined by requested township, range and section with an additional one-mile buffer surrounding the requested area. This is done to provide you with a more inclusive set of records and to capture records that may be immediately adjacent to the requested area.

(2) On the map, polygons represent one or more source features as well as the locational uncertainty associated with the source features. A source feature is a point, line, or polygon that is the basic mapping unit of an EO Representation. The recorded location of the occurrence may vary from its true location due to many factors, including the level of expertise of the data collector, differences in survey techniques and equipment used, and the amount and type of information obtained. Therefore, this inaccuracy is characterized as locational uncertainty, and is now incorporated in the representation of an EO. If you have a question concerning a specific EO, please do not hesitate to contact us.

(3) Location information for animals represents occupied breeding habitat; location information for plants represents known occurrences of plant species, and, like animals, has an implied range that may not be fully conveyed by the mapped data. Most locations are depicted as points, but some, especially those that cover large area, are depicted as polygons on the map. The approximate boundaries of these polygons are color-coded to help differentiate vertebrate classes and plants.

(4) This report may include sensitive data, and is not intended for general distribution, publication or for use outside of your agency. In particular, public release of specific location information may jeopardize the welfare of threatened, endangered, or sensitive species or communities.

(5) The accompanying map(s) display management status, which may differ from ownership. Also, this report may include data from privately owned lands, and approval by the landowner is advisable if specific location information is considered for distribution. Features shown on this map do not imply public access to any lands.

(6) Additional biological data for the search area(s) may be available from other sources. We suggest you contact the U.S. Fish and Wildlife Service for any additional information on threatened and endangered species (406-449-5225). Also, significant gaps exist in the Heritage Program's fisheries data, and we suggest you contact the Montana Rivers Information System for information related to your area of interest (406-444-3345).

(7) Additional information on species habitat, ecology and management is available on our web site in the Plant and Animal Field Guides, which we encourage you to consult for valuable information. You can access these guides at http://nhp.nris.state.mt.us. General information on any species can be found by accessing the link to NatureServe Explorer.

The results of a data search by the Montana Natural Heritage Program reflect the current status of our data collection efforts. These results are not intended as a final statement on sensitive species within a given area, or as a substitute for on-site surveys, which may be required for environmental assessments. The information is intended for project screening only with respect to species of concern, and not as a determination of environmental impacts, which should be gained in consultation with appropriate agencies and authorities.

I hope the enclosed information is helpful to you. Please feel free to contact me at (406) 444-3290 or via my e-mail address, below, should you have any questions or require additional information.

Sincerely,

Martin P. Miller

Martin P. Miller
Montana Natural Heritage Program
(martinm@state.mt.us)

Montana Natural Heritage Program

P.O. Box 201800
1515 East Sixth Avenue
Helena, Montana 59620-1800
(406) 444-5354
http://mtnhp.org

Explanation of Element Occurrence Reports

Since 1985, the Montana Natural Heritage Program (MTNHP) has been compiling and maintaining an inventory of the elements of biological diversity in Montana. This inventory includes plant species, animal species, plant communities, and other biological features that are rare, endemic, disjunct, threatened or endangered throughout their range in Montana, vulnerable to extirpation from Montana, or in need of further research.

Individual species, communities, or biological features are referred to as "elements." An "element occurrence" generally falls in one of the following categories:

Plants: A documented location of a plant population. In some instances, adjacent, spatially separated clusters are considered subpopulations and are grouped as one occurrence (e.g., the subpopulations occur in ecologically similar habitats, and are within approximately one air mile of one another).

Animals with limited mobility (most invertebrates, amphibians, reptiles, small mammals, most fish): The location of a specimen collection or of a verified sighting; assumed to represent a breeding population. Additional collections or sightings are often appended to the original record.

Mobile or migratory animals (most birds and larger mammals, some fish): Breeding areas (including nesting territories, dens and leks) and significant aggregation sites (winter feeding areas, staging grounds, or hibernacula).

Communities: All contiguous, high-quality habitat as defined by physical and biological features.

Other: Significant biological features not included in the above categories, such as bird rookeries, peatlands, or state champion trees.

❖

The quantity and quality of data contained in MTNHP reports is dependent on the research and observations of the many individuals and organizations that contribute information to the program.

Please keep in mind that the absence of information for an area does not mean the absence of significant biological features. Reports produced by the Montana Natural Heritage Program summarize information known to the program at the time of a request. These reports are not intended as a final statement on the elements or areas being considered, nor are they a substitute for on-site surveys, which may be required for environmental assessments.

As a user of MTNHP, your contributions of data are essential to maintaining the accuracy of our databases. New or updated location information for all species of special concern is always welcome.

We encourage you to visit our website at http://mtnhp.org. On-line tools include species lists, an electronic version of *Montana Bird Distribution*, and search capabilities by county, management unit, or USGS 7.5' quadrangle. Also available are *Montana Rare Plant* and *Animal Field Guides*, which contain photos, illustrations, and supporting information on Montana's rare species.

NL not listed or no designation (see below)

XN non-essential experimental population

(PS) Indicates "partial status" - status in only a portion of the species' range. Typically indicated in a "full" species record where an infraspecific taxon or population, that has a record in the database, has USESA status, but the entire species does not.

(PS:value) Indicates "partial status" - status in only a portion of the species' range. The value of that status appears in parentheses because the entity with status is not recognized as a valid taxon by Central Sciences (usually a population defined by geopolitical boundaries or defined administratively, such as experimental populations).

A species can have more than one federal designation if the species' status varies within its range. In these instances, the Montana designation is listed first. Example: LELT = species is listed as endangered in Montana; elsewhere in its range it is listed as threatened.

U.S. Forest Service Status

The status of species on Forest Service lands as defined by the U.S. Forest Service manual (2670.22). These taxa are listed as such by the Regional Forester (Northern Region) on National Forests in Montana. Species are listed as:

T/E/P Listed as Threatened (LT) or Endangered (LE) under the Endangered Species Act or proposed for listing (P), and known or suspected to occur on national forests.

S sensitive species, subspecies or variety, for which the Regional Forester has determined there is a concern for population viability rangewide or in the region.

Bureau of Land Management Status

The status of species on Bureau of Land Management land is defined by the BLM 6840 manual and designated by the Montana State Office of the BLM in 1996:

S Special Status animals and Sensitive plant species: Proven to be imperiled in at least part of its range and documented to occur on BLM lands.

W watch species: either known to be imperiled and suspected to occur on BLM lands, suspected to be imperiled and documented on BLM lands, or needing further study for other reasons.

Other terms that may be used in this report

USGS quadrangle – Name of the 7.5-minute USGS topographic map(s) where the population is located.

Township, range, section, TRS comments - Legal description of the centroid of the population and, if known, additional townships or sections. TRS locators may be based on unsurveyed townships; in such cases, the locators are derived from U. S. Forest Service visitor maps or from BLM surface management status maps. This is done for convenience in describing species locations; the information does not necessarily indicate legal boundaries.

Representation Accuracy – represents the assigned level of how accurately the final EO Rep reflects the original observed area (estimated value).

Very High	(>95%)
High	(>80%, <=95%)
Medium	(>20%, <=80%)
Low	(>0%, <=20%)

Last observation: date the element was last observed extant at the site (not necessarily the date the site was last visited).

Land Owner/manager – the ownership or management of the land on which the element occurs. Areas are generally listed from smallest to largest. In most instances, this information is derived from U.S. Forest Service visitor maps or from BLM surface management status maps.

Please remember that this report is a summary of information. Additional data are available on most sites and species.

If you have questions or need further assistance, please contact us either by phone at (406/444-5354), e-mail (mtnhp@state.mt.us) or at the mailing address shown on the first page.

Montana Natural Heritage Program

Map Label	Scientific Name	Common Name
1	Oligotrichum aligerum	

Biological Information

Species of Concern (Y)/Potential Concern (W): Y

Element Subnational ID	11288	EO Number 1	Global Rank	G5	State Rank S1
USFWS Endangered Species Status			Forest Service Status		BLM Status

Observation Dates: Last	1967-07-16	First	1967-07-16

EO Data

General Description ON SOIL ALONG ROAD.

General Comments

Directions ALONG ROAD TO SNOWSHOE MINE.

References

Specimen ELLIOTT, J.C. (S.N.). 1967. SPECIMEN #109765. MONTU.

Representation Accuracy Medium (>20%, <=80%)

Size (acres): Observed

EO Rep. Size (acres): 3089.46

Min. Elevation (feet) 4,400

Max. Elevation (feet)

County Lincoln

USGS Quadrangle Map Cable Mountain, Snowshoe Peak

Land Owner/Manager KOOTENAI NATIONAL FOREST, LIBBY RANGER DISTRICT, PRIVATELY OWNED LAND (INDIVIDUAL OR CORPORATE)

Township/Range/Section 028N031W - 04, 028N031W - 05, 028N031W - 06, 028N031W - 07, 028N031W - 08, 028N031W - 09, 028N031W - 17, 028N031W - 18, 028N032W - 01, 028N032W - 12, 029N032W - 35, 029N032W - 36

USDA Natural Resources Conservation Service
PLANTS Profile

Oligotrichum aligerum Mitt.
oligotrichum moss

Common NAME
Oligotrichum MOSS

Symbol:	OLAL
Group:	Moss
Family:	Polytrichaceae
Growth Habit:	Nonvascular
Duration:	
U.S. Nativity:	Native

Taxonomic Hierarchy for:
Oligotrichum aligerum Mitt.

Kingdom	Plantae– Plants
Division	Bryophyta– Mosses
Subdivision	Musci–
Class	Bryopsida– True mosses
Subclass	Bryidae–
Order	Polytrichales–
Family	Polytrichaceae–
Genus	*Oligotrichum* Lam. & DC.– oligotrichum moss
Species	*Oligotrichum aligerum* Mitt.– oligotrichum moss

Integrated Taxonomic Information System (ITIS)
Taxonomic Serial Number for *Oligotrichum aligerum* Mitt.:
547918

Time Generated: Thur 7:32 AM - 08/26/2004

Montana Natural Heritage Program

Map Label	Scientific Name	Common Name
2	Ursus arctos horribilis	Grizzly Bear

Biological Information

Species of Concern (Y)/Potential Concern (W): Y

Element Subnational ID	13697	EO Number	9	Global Rank	G4T3T4	State Rank	S3
USFWS Endangered Species Status	PS:LT,XN			Forest Service Status	THREATENED	BLM Status	SPECIAL STATUS

Observation Dates: Last First

EO Data

MINIMUM OF 15-20 BEARS. THE BOUNDARIES FOR THIS OCCURRENCE ARE BASED ON THE RECOVERY ZONE BOUNDARY.

General Description

GRIZZLIES USE A WIDE RANGE OF HABITATS, FROM LOW-ELEVATION RIPARIAN AREAS TO ALPINE AND TALUS SLOPES.

General Comments

THE CABINET-YAAK RECOVERY ZONE EXTENDS INTO IDAHO AND THERE IS CONTIGUOUS OCCUPIED HABITAT IN BRITISH COLUMBIA. MTNHP HAS SEPARATED THE RECOVERY ZONE INTO A YAAK AREA AND A CABINET AREA, SINCE THE KOOTENAI RIVER VALLEY WITH THE HIGHWAY AND RAILROAD IS A SIGNIFICANT OBSTACLE TO BEAR MOVEMENTS, AND HAS ALSO MODIFIED THE BOUNDARY TO REFLECT "OCCUPIED HABITAT" BASED ON THE PROFESSIONAL JUDGEMENT OF THE MTNHP ZOOLOGIST.

Directions

THIS OCCURRENCE IS BOUNDED TO THE SOUTH BY THE CLARK FORK RIVER AND THE NORTH BY THE KOOTENAI RIVER; AND BOUNDED TO THE EAST BY LIBBY CREEK, EAST FISHER CREEK, FISHTRAP CREEK AND THOMPSON RIVER, AND TO THE WEST BY THE IDAHO BORDER.

References

Servheen, C. 1993. Grizzly bear recovery plan. Unpublished report to the U.S. FWS. University of Montana, Missoula. 181 pp.
U.S. Fish and Wildlife Service. 1990. Grizzly bear recovery plan (Draft). Unpubl. Rep., Missoula, MT. 117 pp.

Specimen

Montana Natural Heritage Program

Representation Accuracy	Low (>0%, <=20%)
Size (acres): Observed	
EO Rep. Size (acres):	137943
Min. Elevation (feet)	1,800
Max. Elevation (feet)	8,700
County	Lincoln, Sanders
USGS Quadrangle Map	Barren Peak, Belknap, Benning Mountain, Big Hole Peak, Cabinet, Cable Mountain, Calico Creek, Crowell Mountain, Curley Creek, Eddy Mountain, Elephant Peak, Fishtrap Lake, Gem Peak, Goat Peak, Helwick Peak, Heron, Horse Mountain, Howard Lake, Ibex Peak, Kenelty Mountain, Kilbrennan Lake, Kootenai Falls, Larchwood, Leonia, Libby, Little Hoodoo Mountain, Loneman Creek, Mantrap Fork, Miller Lake, Mount Headley, Noxon, Noxon Rapids Dam, Penrose Peak, Priscilla Peak, Richards Peak, Sawtooth Mountain, Scenery Mountain, Scotchman Peak, Seven Point Mountain, Silver Butte Pass, Smeads Bench, Smith Mountain, Snowshoe Peak, Spar Lake, Sunset Peak, Table Top Mountain, Thompson Falls, Treasure Mountain, Trout Creek, Troy, Vermilion Peak, Weeksville
Land Owner/Manager	CABINET MOUNTAINS WILDERNESS, CORPORATE TIMBERLANDS, KOOTENAI NATIONAL FOREST, LOLO NATIONAL FOREST, PLAINS/THOMPSON FALLS RANGER DISTRICT, THE NATURE CONSERVANCY - CONSERVATION EASEMENTS
Township/Range/Section	020N026W - 06, 020N027W - 01, 020N027W - 02, 020N027W - 03, 020N027W - 04, 020N027W - 05, 020N027W - 06, 020N027W - 07, 020N027W - 08, 020N027W - 09, 020N027W - 10, 020N027W - 11, 020N027W - 12, 020N027W - 15, 020N027W - 16, 020N027W - 17, 020N027W - 18, 020N027W - 19, 020N027W - 20, 020N028W - 01, 020N028W - 02, 020N028W - 03, 020N028W - 04, 020N028W - 05, 020N028W - 06, 020N028W - 07, 020N028W - 08, 020N028W - 09, 020N028W - 10, 020N028W - 11, 020N028W - 12, 020N028W - 13, 020N028W - 14, 020N028W - 15, 020N028W - 16, 020N029W - 01, 020N029W - 02, 020N029W - 03, 020N029W - 12, 021N026W - 04, 021N026W - 05, 021N026W - 06, 021N026W - 07, 021N026W - 08, 021N026W - 09, 021N026W - 16, 021N026W - 17, 021N026W - 18, 021N026W - 19, 021N026W - 20, 021N026W - 21, 021N026W - 28, 021N026W - 29, 021N026W - 30, 021N026W - 31, 021N026W - 32, 021N027W - 01, 021N027W - 02, 021N027W - 03, 021N027W - 04, 021N027W - 05, 021N027W - 06, 021N027W - 07, 021N027W - 08, 021N027W - 09, 021N027W - 10, 021N027W - 11, 021N027W - 12, 021N027W - 13, 021N027W - 14, 021N027W - 15, 021N027W - 16, 021N027W - 17, 021N027W - 18, 021N027W - 19, 021N027W - 20, 021N027W - 21, 021N027W - 22, 021N027W - 23, 021N027W - 24, 021N027W - 25, 021N027W - 26, 021N027W - 27, 021N027W - 28, 021N027W - 29, 021N027W - 30, 021N027W - 31, 021N027W - 32, 021N027W - 33, 021N027W - 34, 021N027W - 35, 021N027W - 36, 021N028W - 01, 021N028W - 02, 021N028W - 03, 021N028W - 04, 021N028W - 05, 021N028W - 06, 021N028W - 07, 021N028W - 08, 021N028W - 09, 021N028W - 10, 021N028W - 11, 021N028W - 12, 021N028W - 13, 021N028W - 14, 021N028W - 15, 021N028W - 16, 021N028W - 17, 021N028W - 18, 021N028W - 19, 021N028W - 20, 021N028W - 21, 021N028W - 22, 021N028W - 23, 021N028W - 24, 021N028W - 25, 021N028W - 26, 021N028W - 27, 021N028W - 28, 021N028W - 29, 021N028W - 30, 021N028W - 31, 021N028W - 32, 021N028W - 33, 021N028W - 34, 021N028W - 35, 021N028W - 36, 021N029W - 01, 021N029W - 02, 021N029W - 03, 021N029W - 04, 021N029W - 05, 021N029W - 06, 021N029W - 07, 021N029W - 08, 021N029W - 09, 021N029W - 10, 021N029W - 11, 021N029W - 12, 021N029W - 13, 021N029W - 14, 021N029W - 15, 021N029W - 16, 021N029W - 17, 021N029W - 18, 021N029W - 20, 021N029W - 21, 021N029W - 22, 021N029W - 23, 021N029W - 24, 021N029W - 25, 021N029W - 26, 021N029W - 27, 021N029W - 28, 021N029W - 34, 021N029W - 35, 021N029W - 36, 021N030W - 01, 022N026W - 06, 022N026W - 07, 022N026W - 08, 022N026W - 17, 022N026W - 18, 022N026W - 19, 022N026W - 20, 022N026W - 21, 022N026W - 28, 022N026W - 29, 022N026W - 30, 022N026W - 31, 022N026W - 32, 022N026W - 33, 022N027W - 01, 022N027W - 02, 022N027W - 03, 022N027W - 04, 022N027W - 05, 022N027W - 06, 022N027W - 07, 022N027W - 08, 022N027W - 09, 022N027W - 10, 022N027W - 11, 022N027W - 12, 022N027W - 13, 022N027W - 14, 022N027W - 15, 022N027W - 16, 022N027W - 17, 022N027W - 18, 022N027W - 19, 022N027W - 20, 022N027W - 21, 022N027W - 22, 022N027W - 23, 022N027W - 24, 022N027W - 25, 022N027W - 26, 022N027W - 27, 022N027W - 28, 022N027W - 29, 022N027W - 30, 022N027W - 31, 022N027W - 32, 022N027W - 33, 022N027W - 34, 022N027W - 35, 022N027W - 36, 022N028W - 01, 022N028W - 02, 022N028W - 03, 022N028W - 04, 022N028W - 05, 022N028W - 06, 022N028W - 07, 022N028W - 08, 022N028W - 09, 022N028W - 10, 022N028W - 11, 022N028W - 12, 022N028W - 13, 022N028W - 14, 022N028W - 15, 022N028W - 16, 022N028W - 17, 022N028W - 18, 022N028W - 19, 022N028W - 20, 022N028W - 21, 022N028W - 22, 022N028W - 23, 022N028W - 24, 022N028W - 25, 022N028W - 26, 022N028W - 27, 022N028W - 28, 022N028W - 29, 022N028W - 30, 022N028W - 31, 022N028W - 32, 022N028W - 33, 022N028W - 34, 022N028W - 35, 022N028W - 36, 022N029W - 01, 022N029W - 02, 022N029W - 03, 022N029W - 04, 022N029W - 05, 022N029W - 06, 022N029W - 07, 022N029W - 08, 022N029W - 09, 022N029W - 10, 022N029W - 11, 022N029W - 12, 022N029W - 13, 022N029W - 14, 022N029W - 15, 022N029W - 16, 022N029W - 17, 022N029W - 18, 022N029W - 19, 022N029W - 20, 022N029W - 21, 022N029W -

Montana Natural Heritage Program

Map Label	Scientific Name	Common Name
3	Hygrohypnum cochlearifolium	

Biological Information

Species of Concern (Y)/Potential Concern (W): Y

Element Subnational ID	13922	EO Number 1	Global Rank	G4	State Rank S1
USFWS Endangered Species Status			Forest Service Status		BLM Status

Observation Dates: Last	1960-07-25	First	1960-07-25

EO Data

General Description	SPLASHED ROCKS AND SMALL WATERFALL FACES.
General Comments	
Directions	LEIGH LAKE TRAIL.
References	
Specimen	SCHOFIELD, W.B. (11978). 1960. SPECIMEN #51706. MONTU.

Representation Accuracy	Low (>0%, <=20%)		
Size (acres): Observed		EO Rep. Size (acres):	49431.4
Min. Elevation (feet)	4,200	Max. Elevation (feet)	
County	Lincoln, Sanders		
USGS Quadrangle Map	Cable Mountain, Little Hoodoo Mountain, Snowshoe Peak, Treasure Mountain		
Land Owner/Manager	CABINET MOUNTAINS WILDERNESS, KOOTENAI NATIONAL FOREST, LIBBY RANGER DISTRICT		
Township/Range/Section	028N031W - 01, 028N031W - 02, 028N031W - 03, 028N031W - 04, 028N031W - 05, 028N031W - 06, 028N031W - 07, 028N031W - 08, 028N031W - 09, 028N031W - 10, 028N031W - 11, 028N031W - 12, 028N031W - 14, 028N031W - 15, 028N031W - 16, 028N031W - 17, 028N031W - 18, 028N031W - 19, 028N031W - 20, 028N031W - 21, 028N031W - 22, 028N031W - 23, 028N031W - 27, 028N031W - 28, 028N031W - 29, 028N031W - 30, 028N032W - 01, 028N032W - 02, 028N032W - 03, 028N032W - 04, 028N032W - 05, 028N032W - 08, 028N032W - 09, 028N032W - 10, 028N032W - 11, 028N032W - 12, 028N032W - 13, 028N032W - 14, 028N032W - 15, 028N032W - 16, 028N032W - 21, 028N032W - 22, 028N032W - 23, 028N032W - 24, 028N032W - 25, 028N032W - 26, 029N031W - 07, 029N031W - 08, 029N031W - 09, 029N031W - 15, 029N031W - 16, 029N031W - 17, 029N031W - 18, 029N031W - 19, 029N031W - 20, 029N031W - 21, 029N031W - 22, 029N031W - 26, 029N031W - 27, 029N031W - 28, 029N031W - 29, 029N031W - 30, 029N031W - 31, 029N031W - 32, 029N031W - 33, 029N031W - 34, 029N031W - 35, 029N032W - 09, 029N032W - 10, 029N032W - 11, 029N032W - 12, 029N032W - 13, 029N032W - 14, 029N032W - 15, 029N032W - 16, 029N032W - 17, 029N032W - 19, 029N032W - 20, 029N032W - 21, 029N032W - 22, 029N032W - 23, 029N032W - 24, 029N032W - 25, 029N032W - 26, 029N032W - 27, 029N032W - 28, 029N032W - 29, 029N032W - 30, 029N032W - 31, 029N032W - 32, 029N032W - 33, 029N032W - 34, 029N032W - 35, 029N032W - 36		

USDA Natural Resources Conservation Service
PLANTS Profile

Hygrohypnum cochlearifolium (Vent. ex De Not.) Broth.
hygrohypnum moss

Symbol:	HYCO13
Group:	Moss
Family:	Amblystegiaceae
Growth Habit:	Nonvascular
Duration:	
U.S. Nativity:	Native

Taxonomic Hierarchy for:
Hygrohypnum cochlearifolium (Vent. ex De Not.) Broth.

Kingdom	Plantae– Plants
Division	Bryophyta– Mosses
Subdivision	Musci–
Class	Bryopsida– True mosses
Subclass	Bryidae–
Order	Hypnales–
Family	Amblystegiaceae–
Genus	*Hygrohypnum* Lindb.– hygrohypmum moss
Species	*Hygrohypnum cochlearifolium* (Vent. ex De Not.) Broth.– hygrohypnum moss

Integrated Taxonomic Information System (ITIS)
Taxonomic Serial Number for *Hygrohypnum cochlearifolium* (Vent. ex De Not.) Broth.:
547853

Time Generated: Thur 7:35 AM - 08/26/2004

Montana Natural Heritage Program

Map Label	Scientific Name	Common Name
4	Felis lynx	Lynx

Biological Information

Species of Concern (Y)/Potential Concern (W): Y

Element Subnational ID	13134	EO Number	450	Global Rank	G5	State Rank	S3
USFWS Endangered Species Status	PS:LT			Forest Service Status		BLM Status	

Observation Dates: Last First

EO Data

General Description

General Comments

Directions

References

Specimen

Montana Natural Heritage Program

Representation Accuracy	
Size (acres): Observed	
EO Rep. Size (acres):	224942
Min. Elevation (feet)	1,870
Max. Elevation (feet)	11,187
County	Beaverhead, Carbon, Cascade, Deer Lodge, Flathead, Gallatin, Glacier, Granite, Jefferson, Judith Basin, Lake, Lewis and Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweet Grass, Teton, Wheatland
USGS Quadrangle Map	Adair, Ahern Pass, Ajax Ranch, Alberton, Alder, Alder Gulch, Alexander Mountain, Allan Mountain, Alpine, Alta, Amelong Creek, Amphitheatre Mountain, Anaconda North, Anaconda South, Antelope Creek, Argenta, Arlee, Arrastra Mountain, Arsenic Mountain, Ash Mountain, Ashley Mountain, Austin, Avon, Babb, Bachelor Mountain, Baggs Creek, Bailey Mountain, Bald Hills, Bald Knob, Bald Top Mountain, Baldy Lake, Bandbox Mountain, Banfield Mountain, Bannock Pass, Bare Cone, Bare Mountain, Barker, Barr Creek, Barren Peak, Basin, Bassoo Peak, Bata Mountain, Beacon Point, Bean Lake, Bear Trap Creek, Bearmouth, Beartrap Mountain, Beaver Lake, Beehive, Belknap, Belmont Point, Belmore Sloughs, Belt Park Butte, Benchmark, Bend, Bender Point, Benning Mountain, Berge Peak, Big Draw, Big Hawk Mountain, Big Hole Battlefield, Big Hole Pass, Big Hole Peak, Big Horn Peak, Big Rock, Big Salmon Lake East, Big Salmon Lake West, Big Table Mountain, Bigfork, Bighorn Mountain, Bison Canyon, Bison Mountain, Black Mountain, Black Peak, Black Pine Ridge, Black Pyramid Mountain, Blacktail, Blacktail Deer Creek, Blankenbaker Flats, Blodgett Mountain, Bloom Peak, Blowout Mountain, Blue Grass Ridge, Blue Joint, Blue Mountain, Blue Point, Bohannon Spring, Bonner, Bonnet Top, Boston Coulee School, Boulder Lakes, Boulder Peak, Bowen Lake, Boyd Mountain, Bozeman Pass, Brays Canyon, Brisbin, Broomtail Ridge, Browns Lake, Bruin Hill, Bubbling Springs, Bucks Nest, Buffalo Bridge, Buffalo Lake NE, Bull Island, Bull Lake, Bungalow Mountain, Burke, Burnt Fork Lake, Burnt Mountain, Burnt Ridge, Butch Hill, Butte North, Buxton, Cabinet, Cable Mountain, Cadotte Creek, Calico Creek, Calvert, Calx Mountain, Camas Prairie, Camas Ridge East, Camas Ridge West, Camp Creek, Campfire Lake, Canuck Peak, Canyon Creek, Capitol Mountain, Caribou Peak, Carlton Lake, Carpp Ridge, Castagne, Castle Mountain, Castle Reef, Castle Town, Cathedral Peak, Cathedral Point, Cattle Gulch, Cave Mountain, Cayuse Basin, Cedar Lake, Chamberlain Mountain, Charcoal Gulch, Checkerboard, Cherry Creek Canyon, Cherry Lake, Chessman Reservoir, Chief Mountain, Chimney Lakes, Chimney Rock, Chrome Mountain, Cilly Creek, Cinnamon Peak, Cinnamon Spring, Circus Peak, Cirque Lake, Clark Mountain, Cleveland Mountain, Cliff Lake, Clinton, Clyde Park, Columbia Falls North, Columbia Falls South, Comb Rock, Como Peaks, Condon, Coney Peak, Conleys Lake, Connor Creek, Cook Mountain, Cooke City, Coopers Lake, Corley Gulch, Cornish Gulch, Corral Creek, Corvallis, Coxcombe Butte, Coyote Creek, Crater Lake, Crazy Peak, Crescent Cliff, Creston, Crimson Peak, Cripple Horse Mountain, Crowell Mountain, Curley Creek, Cut Bank Pass, Cutoff Mountain, Cyclone Lake, Cygnet Lake, Dahl Lake, Dailey Lake, Daisy Peak, Danaher Mountain, Darby, Davis Mountain, Davis Point, De Borgia North, De Borgia South, Deadman Pass, Deep Creek Park, Deer Creek, Deer Lodge, Deer Mountain, Deer Peak, Demers Ridge, Devils Footstool, Dewey, Dexter Point, Diamond Point, Dick Creek, Dickie Hills, Dickie Peak, Divide Lake, Dixon, Dome Mountain, Doris Mountain, Double Falls, Driveway Peak, Drummond, Duck Lake, Dunham Point, Dunkleberg Creek, Dunsire Point, Ear Mountain, Earthquake Lake, East Bay, East Glacier Park, Eddy Mountain, Edna Mountain, Eightmile Creek, El Capitan, Electric Peak, Elephant Peak, Elevation Mountain, Elk Creek, Elk Mountain, Elk Park Pass, Elk Springs, Elkhorn Hot Springs, Ellis Canyon, Elliston, Elmo, Elton, Emerald Lake, Emigrant, Ennis, Ennis Lake, Ermont, Esmeralda Hill, Essex, Ettien Spring, Eureka Basin, Eureka North, Eureka South, Evans, Evaro, Everson Creek, Fairview Peak, Fan Mountain, Felix Peak, Finn, Fish Lake, Fisher Mountain, Fishtail, Fishtrap Lake, Flatiron Mountain, Flint Mountain, Florence, Foolhen Mountain, Fort Connah, Fortine, Fossil Lake, Fourmile Spring, Fox Creek, Fox Gulch, Fred Burr Lake, Freezeout Mountain, French Basin, Frenchtown, Fridley Peak, Gable Mountain, Gable Peaks, Gallatin Gateway, Gallatin Peak, Garden Poin
Land Owner/Manager	

Montana Natural Heritage Program

Township/Range/Section

0, 001N009W - 03, 001N009W - 04, 001N009W - 05, 001N009W - 06, 001N009W - 07, 001N009W - 08, 001N009W - 09, 001N009W - 16, 001N009W - 17, 001N009W - 18, 001N009W - 19, 001N009W - 20, 001N009W - 21, 001N009W - 29, 001N009W - 30, 001N009W - 31, 001N009W - 32, 001N010W - 01, 001N010W - 02, 001N010W - 03, 001N010W - 04, 001N010W - 05, 001N010W - 06, 001N010W - 07, 001N010W - 08, 001N010W - 09, 001N010W - 10, 001N010W - 11, 001N010W - 12, 001N010W - 13, 001N010W - 14, 001N010W - 15, 001N010W - 16, 001N010W - 17, 001N010W - 18, 001N010W - 19, 001N010W - 20, 001N010W - 21, 001N010W - 22, 001N010W - 23, 001N010W - 24, 001N010W - 25, 001N010W - 26, 001N010W - 27, 001N010W - 28, 001N010W - 29, 001N010W - 30, 001N010W - 31, 001N010W - 32, 001N010W - 33, 001N010W - 34, 001N010W - 35, 001N010W - 36, 001N011W - 01, 001N011W - 02, 001N011W - 03, 001N011W - 04, 001N011W - 05, 001N011W - 06, 001N011W - 07, 001N011W - 08, 001N011W - 09, 001N011W - 10, 001N011W - 11, 001N011W - 12, 001N011W - 13, 001N011W - 14, 001N011W - 15, 001N011W - 16, 001N011W - 17, 001N011W - 18, 001N011W - 19, 001N011W - 20, 001N011W - 21, 001N011W - 22, 001N011W - 23, 001N011W - 24, 001N011W - 25, 001N011W - 26, 001N011W - 27, 001N011W - 28, 001N011W - 29, 001N011W - 30, 001N011W - 31, 001N011W - 32, 001N011W - 33, 001N011W - 34, 001N011W - 35, 001N011W - 36, 001N012W - 01, 001N012W - 02, 001N012W - 03, 001N012W - 04, 001N012W - 05, 001N012W - 06, 001N012W - 07, 001N012W - 08, 001N012W - 09, 001N012W - 10, 001N012W - 11, 001N012W - 12, 001N012W - 13, 001N012W - 14, 001N012W - 15, 001N012W - 16, 001N012W - 17, 001N012W - 18, 001N012W - 19, 001N012W - 20, 001N012W - 21, 001N012W - 22, 001N012W - 23, 001N012W - 24, 001N012W - 25, 001N012W - 26, 001N012W - 27, 001N012W - 28, 001N012W - 29, 001N012W - 30, 001N012W - 31, 001N012W - 32, 001N012W - 33, 001N012W - 34, 001N012W - 35, 001N012W - 36, 001N013W - 01, 001N013W - 02, 001N013W - 03, 001N013W - 04, 001N013W - 05, 001N013W - 07, 001N013W - 08, 001N013W - 09, 001N013W - 10, 001N013W - 11, 001N013W - 12, 001N013W - 13, 001N013W - 14, 001N013W - 15, 001N013W - 16, 001N013W - 17, 001N013W - 18, 001N013W - 19, 001N013W - 20, 001N013W - 21, 001N013W - 22, 001N013W - 23, 001N013W - 24, 001N013W - 25, 001N013W - 26, 001N013W - 27, 001N013W - 28, 001N013W - 29, 001N013W - 30, 001N013W - 31, 001N013W - 32, 001N013W - 33, 001N013W - 34, 001N013W - 35, 001N013W - 36, 001N014W - 02, 001N014W - 03, 001N014W - 04, 001N014W - 05, 001N014W - 06, 001N014W - 07, 001N014W - 08, 001N014W - 09, 001N014W - 10, 001N014W - 16, 001N014W - 17, 001N014W - 18, 001N014W - 19, 001N014W - 20, 001N014W - 24, 001N014W - 25, 001N014W - 26, 001N014W - 27, 001N014W - 30, 001N014W - 33, 001N014W - 34, 001N014W - 35, 001N014W - 36, 001N015W - 01, 001N015W - 02, 001N015W - 03, 001N015W - 04, 001N015W - 05, 001N015W - 06, 001N015W - 07, 001N015W - 08, 001N015W - 09, 001N015W - 10, 001N015W - 11, 001N015W - 12, 001N015W - 13, 001N015W - 14, 001N015W - 15, 001N015W - 16, 001N015W - 17, 001N015W - 18, 001N015W - 19, 001N015W - 20, 001N015W - 21, 001N015W - 22, 001N015W - 23, 001N015W - 24, 001N015W - 25, 001N015W - 26, 001N015W - 27, 001N015W - 28, 001N015W - 29, 001N015W - 30, 001N015W - 31, 001N015W - 32, 001N015W - 33, 001N015W - 34, 001N015W - 35, 001N016W - 01, 001N016W - 02, 001N016W - 03, 001N016W - 04, 001N016W - 05, 001N016W - 06, 001N016W - 07, 001N016W - 08, 001N016W - 09, 001N016W - 10, 001N016W - 11, 001N016W - 12, 001N016W - 13, 001N016W - 14, 001N016W - 15, 001N016W - 16, 001N016W - 17, 001N016W - 18, 001N016W - 19, 001N016W - 20, 001N016W - 21, 001N016W - 22, 001N016W - 23, 001N016W - 24, 001N016W - 25, 001N016W - 26, 001N016W - 27, 001N016W - 28, 001N016W - 29, 001N016W - 30, 001N016W - 31, 001N016W - 32, 001N016W - 33, 001N016W - 34, 001N016W - 35, 001N016W - 36, 001N017W - 01, 001N017W - 02, 001N017W - 03, 001N017W - 04, 001N017W - 05, 001N017W - 06, 001N017W - 07, 001N017W - 08, 001N017W - 09, 001N017W - 10, 001N017W - 11, 001N017W - 12, 001N017

Montana Natural Heritage Program

Map Label	Scientific Name	Common Name
5	Radiodiscus abietum	Fir Pinwheel

Biological Information

Species of Concern (Y)/Potential Concern (W): Y

Element Subnational ID	15111	EO Number	3	Global Rank	GU	State Rank	S2S3
USFWS Endangered Species Status				Forest Service Status		BLM Status	

Observation Dates: Last	1960-07-27	First	1960-07-27

EO Data

General Description: Under log.

General Comments

Directions: Between Leigh Lake Trail and Leigh Creek.

References:

Brunson, R. B., and R. H. Russell. 1967. Radiodiscus, new to molluscan fauna of Montana. Nautilus 81:18-21.

Hendricks, Paul. Assistant Zoologist, Montana Natural Heritage Program, 1515 E. Ave., Helena, Montana 59620. Personal communication to the Montana Natural Heritage Program.

Specimen

Representation Accuracy	Medium (>20%, <=80%)		
Size (acres): Observed		EO Rep. Size (acres):	49.1696
Min. Elevation (feet)	4,232	Max. Elevation (feet)	5,610
County	Lincoln		
USGS Quadrangle Map	Snowshoe Peak		
Land Owner/Manager	CABINET MOUNTAINS WILDERNESS, KOOTENAI NATIONAL FOREST, LIBBY RANGER DISTRICT		
Township/Range/Section	028N031W - 06, 029N032W - 36		

Montana Species of Concern
Snowshoe Mine
Reclamation Project

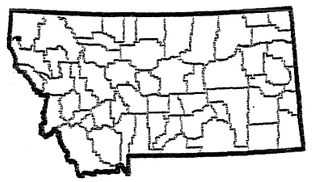
Search Area

Biological Data
- Vertebrate animal
- Community
- Invertebrate animal
- Nonvascular Plant
- Other
- Vascular Plant

Conservation Easements

Special Designations
- Other special Areas (ACEC, RNA, PRIM)
- Research Natural Areas (all agencies)
- Wilderness (all agencies)
- Wild and Scenic Rivers (all agencies)

Land Status
- Bureau of Land Management
- Bureau of Reclamation
- Army Corps of Engineers & US Dept of Defense
- National Park Service
- US Forest Service
- Other US Dept of Agriculture
- US Fish & Wildlife Service
- Bureau of Indian Affairs Trust
- Tribal
- State Trust
- Montana Fish, Wildlife, & Parks
- University & Institutions
- County & City
- Plum Creek
- Private Conservation
- Other private
- Water



Species locations depicted outside the search area have imprecisely known locations and may actually occur within the search area.

Not all legend items may occur on map.

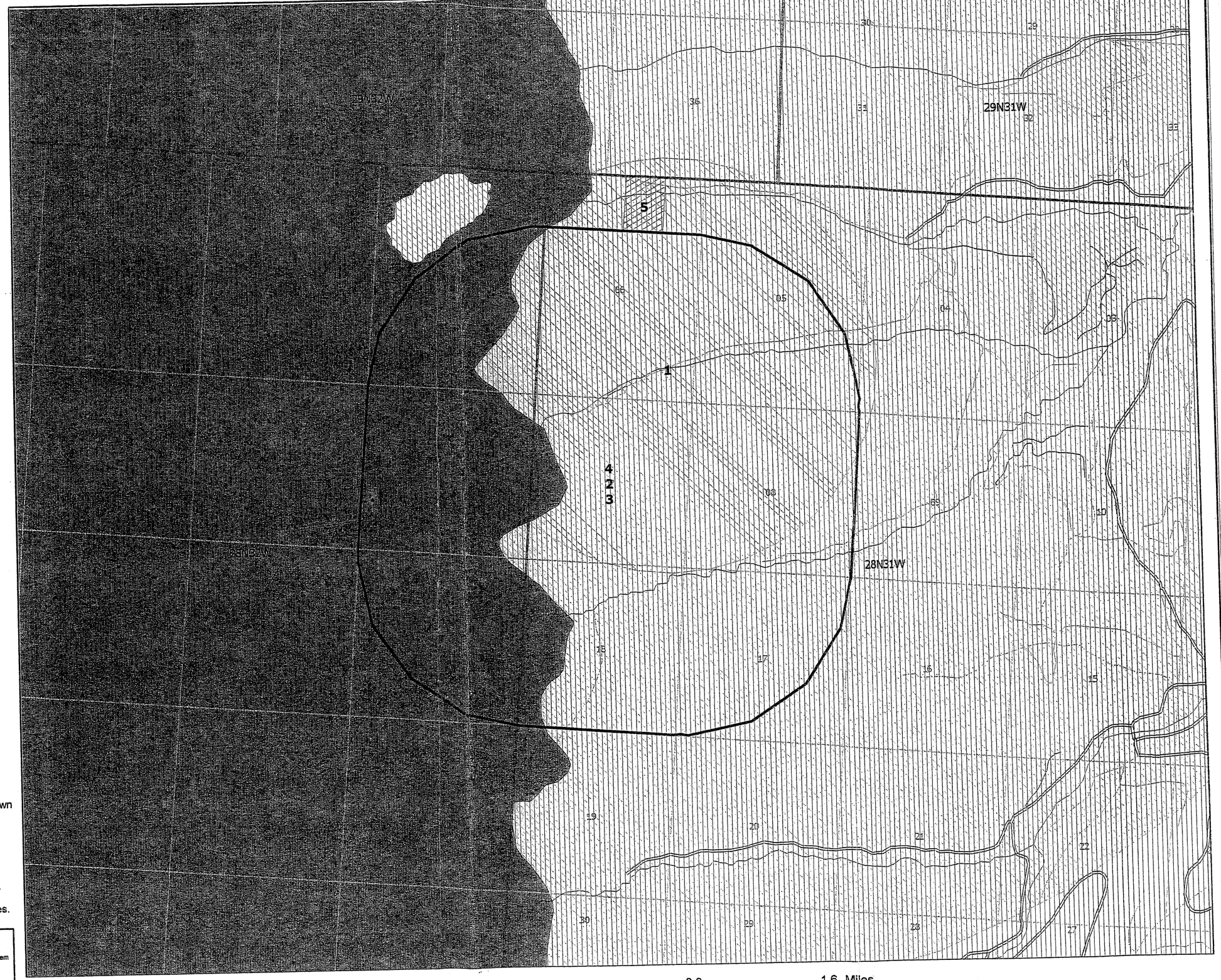
Features shown on this map do not imply public access to any lands.

This map displays management status, which may differ from ownership.

Refer to accompanying documentation for full explanation of map features.

MONTANA Natural Heritage Program

Natural Resource Information System
Montana State Library
PO Box 201800
Helena, MT 59620-1800
(406) 444-5354 mtnhp@state.mt.us



August 23 2004
05mt0013

United States Department of Agriculture | Forest Service | Kootenai N.F. Supervisor's Office | 1101 U.S. Highway 2 West Libby, Mt 59923

File Code: 2670
Route To: *

Date: August 26, 2004

Subject: Snowshoe Mine Site: Threatened, Endangered or Sensitive Species

To: Marty Bennett
Pioneer Technical Services Inc.
P.O. Box 3445
Butte, MT 59702

Dear Mr. Bennett,

In response to your August 23, 2004 request for information on threatened, endangered, or sensitive species or critical habitat known or suspected to occur in the proposed Snowshoe Mine project area, I provide the following:

Listed Species:

Species listed as threatened or endangered under the Endangered Species Act (ESA) known or suspected to occur in the project area include grizzly bear, gray wolf, and lynx.

The project falls in grizzly bear management unit (BMU) #2 (Snowshoe). Currently the habitat standards for core and the percent of the BMU above specified open and total motorized route density levels are being met. There is known use in this BMU by at least two female grizzly with cubs and one female with young (not cubs) (personal communication with Wayne Kasworm, FWS, 8/25/2004).

While there are no known wolf den or rendezvous sites in or near the project area, there have been reports of individual wolves moving through. The nearest pack territory is about 20 air miles southeast of the project area.

Lynx analysis unit (LAU) #14502 overlays the project area. Habitat standards for the amount of denning habitat, amount of unsuitable habitat, and percent of habitat changed to unsuitable over the past 10 years are currently being met. All other standards and guidelines in the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et. al. 2000) are also met at this time. Forest wildlife observation records indicate past lynx use in the area.

"Critical habitat" is a specific term under the ESA. The U.S. Fish and Wildlife Service (FWS) is responsible for designating critical habitat for listed species. To date, they have not designated any critical habitat for any listed species known or suspected to occur in the Snowshoe Mine project area. The FWS is in the process of designating critical habitat for lynx. You would need to contact them at their Helena, MT office for details on that process.

Sensitive Species:

Based on the presence of suitable habitat, there is the potential for several species listed as "sensitive" for Region 1 and the Kootenai National Forest to use the project area. The wildlife species include: black-backed woodpecker, boreal toad, Coeur D'Alene salamander, fisher, northern goshawk, Townsend's big-eared bat, and wolverine. To date there have been no Forest Service, area specific, surveys for these species that cover the Snowshoe Mine project area.

In addition to the wildlife sensitive species there could be as many as 18 sensitive plants (see attached list) found in the project area. The probability of their occurrence is moderate to high, based on riparian habitat conditions (whether old forest, disturbance, and/or cedar present). There is at least one species that is being considered for addition to the sensitive species list that has been found in the area (see attached map).

If you need additional information or have any questions, please feel free to contact me at (406)-293-6211, email me at wjjohnson@fs.fed.us, or stop by the Kootenai National Forest Supervisor's Office in Libby, MT.

Sincerely,

WAYNE J. JOHNSON
Forest Wildlife Biologist

S INCLUDED IN THIS BOOK:

	K.N.F.	LOCATION
illum (Fringed Onion) drop-Carex	Known	D4, D5
virgata (Candystick) drop-Carex	Suspected	
n trichomanes (Maidenhair Spleenwort) drop-Carex	Suspected	drop Carex
mila (Bog Birch) ID	Suspected	
splcant ID	Suspected	D4
n ascendens (Upswept Moonwort)	Known	(D4)
n crenulatum (Crenate Moonwort)	Known	(D3, D4, D5)
n hesperium (Western Moonwort)	Suspected	
n minganense (Mingan Moonwort) drop Carex	Known	D4, D5
n montanum (Mountain Moonwort) drop Carex	Known	(D4)
n paradoxum (Peculiar Moonwort)	Known	(D4)
rdorrhiza (Rope-root Sedge)	Suspected	
a (Pale Sedge) drop Carex	Suspected	
percula (Poor Sedge) drop Carex	Known	D4
mboldea (Common Clarkia)	Known	D7
m calceolus var. parviflorum (Lady's-slipper)	Known	D3, D5
m fasciculatum (Clustered Lady's-slipper)	Suspected	
m passerinum (Sparrow's-egg Lady's-slipper)	Known	D3
earls (Linear-leaved Sundew)	Suspected	
cristata (Crested Shield-fern)	Suspected	
lgantea (Giant Hellerborine)	Suspected	(D3)
n viridicarinatum (Green-keeled Cottongrass) drop Carex	Suspected	Carex (D)
n occidentale (Western Boneset)	Suspected	
sls simplex (Hiker's Gentian)	Suspected	
owellii (Howell's Gumweed)	Suspected	
quatilis (Water Howellia)(T)	Suspected	
geyeri (Geyer's Biscuit Root)	Known	D4, D5, (D7)
ndifolia (Round-leaved Orchis)	Known	D3
ria palustris (Scheuchzeria) drop Carex	Known	D5
oterminalis (Water Bulrush)	Known	D3
dingii* (Spalding's Catchfly)(T)	Suspected	
phegopteris (Beechfern)	Known	D4, D5, D7
myrtilloides* (Velvet-leaved Huckleberry)	Suspected	
lia (Kidney-leaved Violet) drop-Carex	Known	D4

gopteris connectilis

have Sensitive status unless noted by:
Species
reatened
es occurrence reported but not confirmed

D3=Forline D4=Three Rivers D5=Libby D7=Cabinet

OG, MIMBRE, VIOSEL

SENSITIVE AND WATCH PLANT SPECIES - GROUPED BY HABITAT

AQUATIC
Carex chordorrhiza
Drosera linearis
Howellia aquatilis
Scirpus subterminalis

RIPARIAN
(adjacent to flowing or stagnant surface water)
Betula pumila
Botrychium crenulatum
Botrychium montanum
Carex chordorrhiza
Carex livida
Carex paupercula
Cypripedium passerinum (E)
Dryopteris cristata (E)
Epipactis gigantea (E)
Eriophorum viridicarinatum
Gentianopsis simplex
Lycopodium inundatum
Orchis rotundifolia (E)
Scheuchzeria palustris
Thelypteris phegopteris

WET, MOIST, MESIC MEADOWS/ PEATLAND
Botrychium ascendens
Botrychium crenulatum
Botrychium minganense
Botrychium paradoxum
Carex chordorrhiza
Carex livida
Carex paupercula
Cypripedium calceolus var parviflorum
Dryopteris cristata
Epipactis gigantea (E)
Eriophorum viridicarinatum
Gentianopsis simplex
Lycopodium inundatum
Scheuchzeria palustris

MOIST CLIFFS
Asplenium trichomanes
Thelypteris phegopteris

E=often in ecotone
*Montana Forest Habitat Types which could represent this habitat group are: Picea/Eqar, Alba/Caca, Thpl/Ppho, Alba/Opho.

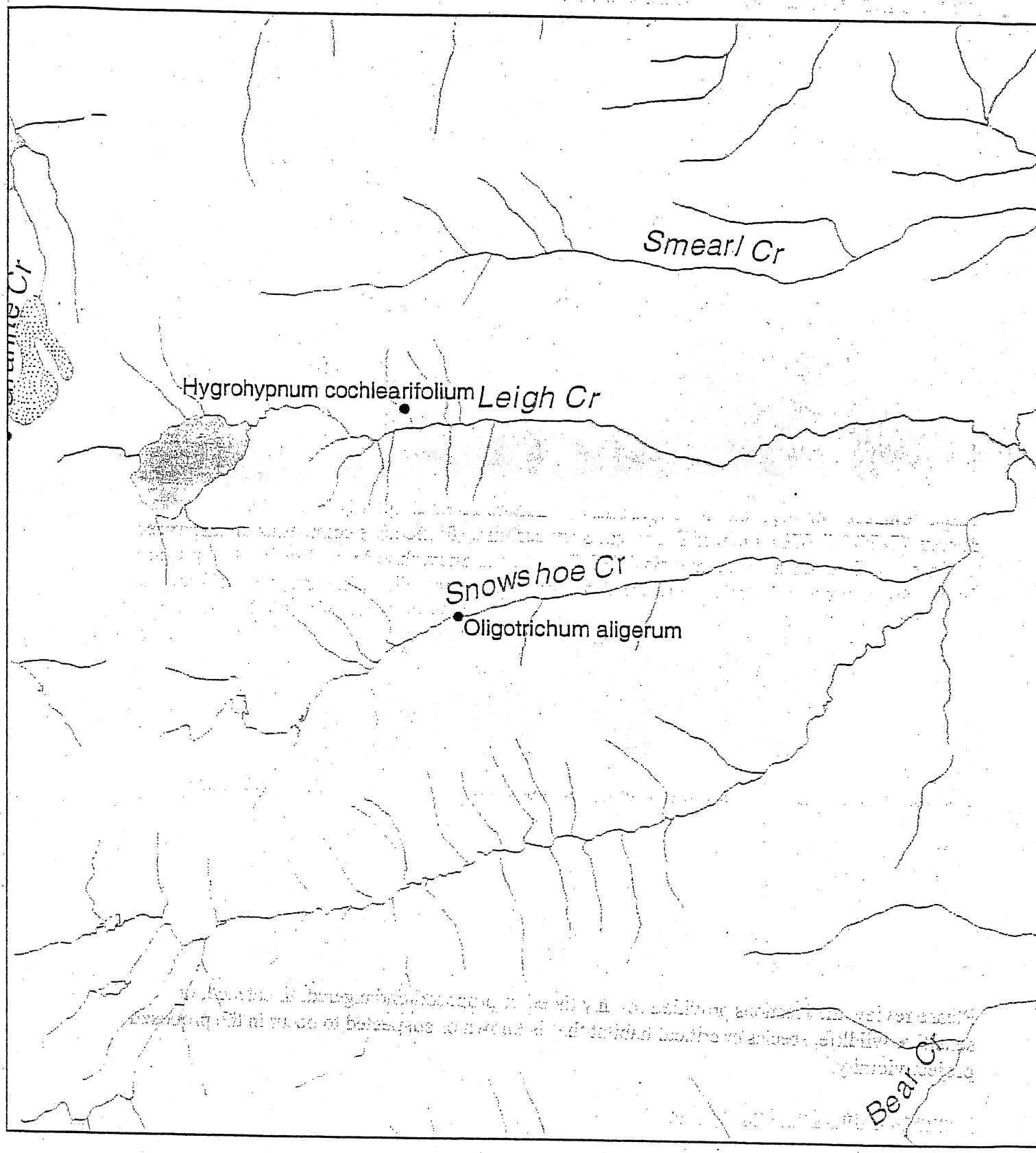
***CONIFEROUS FORESTS**
(w=wetter, mid=mesic, d=drier)
Allotropa virgata (d)
Asplenium trichomanes (w)
Blecnum spicant (w)
Botrychium crenulatum (w to m)
Botrychium minganense (w)
Botrychium montanum (w to m)
Botrychium paradoxum (w to d)
Cypripedium calceolus var parviflor (w)
Cypripedium fasciculatum (d)
Cypripedium passerinum (w) (E)
Dryopteris cristata (w)
Orchis rotundifolia (w)
Thelypteris phegopteris (w)
Vaccinium myrtilloides (w to d)
Viola renifolia (w to m)

OPEN PINE/FIR FORESTS
Clarkia rhomboidea
Cypripedium fasciculatum
Grindelia howellii
Silene spaldingii

OPEN PINE/FIR FORESTS, ROCKY SUBSTRATE
Allium fibrillum
Eupatorium occidentale
Lomatium geyeri

DRY MEADOWS/GRASSLANDS
Botrychium hesperium
Grindelia howellii
Silene spaldingii

CALCAREOUS SOILS
Cypripedium passerinum (E)
Cypripedium calceolus var parviflorum
Orchis rotundifolia



Rexford 1:60,000 Fortine 1:70,000 Troy 1:110,000 Libby 1:110,000 Cabinet 1:85,0

APPENDIX C

DESCRIPTION OF FEDERAL AND STATE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

INTRODUCTION

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d), certain provisions of the current National Contingency Plan (the NCP), 40 CFR Part 300 (1990), and guidance and policy issued by the Environmental Protection Agency (EPA) require that remedial actions taken pursuant to CERCLA authority shall require or achieve compliance with substantive provisions of applicable or relevant and appropriate standards, requirements, criteria, or limitations from state environmental and facility siting laws, and from federal environmental laws at the completion of the remedial action, and/or during the implementation of the remedial action, unless a waiver is granted. These requirements are threshold standards that any selected remedy must meet. See Section 122(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4); 40 CFR § 300.430(f)(1). EPA calls standards, requirements, criteria, or limitations identified pursuant to section 121(d) "ARARs," or applicable or relevant and appropriate requirements.

ARARs are either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances found at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site such that their use is well suited to the particular site. Factors which may be considered in making this determination are presented in CFR § 300.400(g)(2). Compliance with both applicable and relevant and appropriate requirements is mandatory.

Each ARAR or group of related ARARs identified here is followed by a specific statutory or regulatory citation, a classification describing whether the ARAR is applicable or relevant and appropriate, and a description which summarizes the requirements, and addresses how and when compliance with the ARAR will be measured (some ARARs will govern the conduct of the remedial action, some will define the measure of success of the remedial action, and some will do both). The descriptions given here are provided to allow the user a reasonable understanding of the requirements without having to refer constantly to the statute or regulation itself. However, in the event of any inconsistency between the law and the summary provided in this document, the applicable or relevant and appropriate requirement is ultimately the requirement as set out in the law, rather than any paraphrase of the law provided here.

Finally, this list contains a non-exhaustive list of other legal provisions or requirements which should be complied with. ARARs are divided into contaminant specific, location specific, and action specific requirements, as described in the NCP and EPA guidance. For contaminant specific ARARs, ARARs are listed according to the appropriate media.

Contaminant specific ARARs include those laws and regulations governing the release to the environment of materials possessing certain chemical or physical characteristics or containing specific chemical compounds. Contaminant specific ARARs generally set health or risk based

numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount of concentration of a chemical that may be found in, or discharged to, the ambient environment.

Location specific ARARS are restrictions placed on the concentration of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs relate to the geographic or physical position of the site, rather than to the nature of the site contaminants.

Action specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous substances.

Many requirements listed here are promulgated as identical or nearly identical requirements in both federal and state law, usually pursuant to delegated environmental programs administered by EPA and the states, such as the requirements of the federal Clean Water Act and the Montana Water Quality Act. The preamble to the new NCP states that such a situation results in citation to the State provision as the appropriate standard, but treatment of the provision as a federal requirement. ARARs and other laws which are unique to state law are identified separately by the State of Montana.

FEDERAL ARARS

1. FEDERAL CONTAMINANT SPECIFIC REQUIREMENTS

a. Groundwater Standards – Safe Drinking Water Act (Relevant and Appropriate)[1]

The national primary drinking water standards (40 CFR part 141), better known as maximum contaminant levels and maximum contaminant level goals (MCLs and MCLGs), are applicable to the Snowshoe Mine Site area because the aquifer underlying the area is a current public water system, as defined in the Safe Drinking Water Act, 42 U.S.C. § 300f(4).

Standards such as the MCL and MCLG standards are promulgated pursuant to both federal and state law. Under the Safe Drinking Water Act, EPA has granted the State of Montana primacy in implementation and enforcement of the Safe Drinking Water Act. Nevertheless, both federal and state promulgated standards are potential ARARs for the Snowshoe Mine Site. Here, for ease of reference, for the primary contaminants of concern the more stringent of federal or state standards are listed, unless identical, in which case both standards are identified. Thus, the numerical standards identified by the State, which are applicable standards, are duplicated here where equivalent or more stringent.

Chemical	MCLG	MCL
Antimony	0.006 mg/l[2]	0.006/l[3]
Arsenic	N.A.[4]	0.05 milligrams per liter (mg/l)[5]
Cadmium	0.005 mg/l[6]	0.005 mg/l[7]
Copper	1.3 mg/l[8]	1.3 mg/l[9]
Lead	N.A. [10]	0.015 mg/l[11]
Mercury	0.002 mg/l[12]	0.002 mg/l[13]

These standards incorporate applicable Resource Conversation and Recovery Act (RCRA) standards for groundwater found at 40 CFR Part 264, Subpart F, which is incorporated pursuant to state law at ARM 17.54.702. The RCRA standards are the same or less stringent than the MCLs or MCLGs identified above.

b. Air Standards – Clean Air Act (Applicable)

---

1 42 U.S.C. Sections 300f et seq.
2 40 CFR § 141.51.
3 40 CFR § 141.62.
4 An MCLG and a revised MCL for arsenic may be promulgated by EPA in the near future. If promulgated prior to issuance of a decision document for the Snowshoe Mine Site, these standards will be incorporated.
5 40 CFR § 141.11.
6 40 CFR § 141.51.
7 40 CFR § 141.62.
8 40 CFR § 141.51.
9 40 CFR § 141.80(c). The requirement is an action level rather than a simple numerical standard.
10 The MCLG for lead is zero, which is not considered appropriate for Superfund site cleanups.
11 40 CFR § 141.80(c), which establishes an action level rather than a pure numerical standard.
12 40 CFR § 141.51.
13 40 CFR § 141.62.

Limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances are set forth in the action specific requirements, below.

2. FEDERAL LOCATION SPECIFIC REQUIREMENTS

a. Fish and Wildlife Coordination Act (Applicable)

These standards are found at 16 U.S.C. §§ 1531 – 1566 and 40 CFR § 6.302(g). They require that federally funded or authorized projects ensure that any modification of any stream or other water body affected by a funded or authorized action provide for adequate protection of fish and wildlife resources. Compliance with this ARAR necessitates consultation with the U.S. Fish and Wildlife Service (USFWS) and the State of Montana Department of Fish, Wildlife, and Parks. Further consultation with these agencies will occur during cleanup selection and implementation, and specific mitigative or other measures may be identified to achieve compliance with this ARAR.

b. Floodplain Management Order (Applicable)

This Requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,988) mandated that federally funded or authorized actions within the 100 year flood plain avoid, to the maximum extent possible, adverse impacts associated with development of a floodplain. Compliance with this requirement in detailed in EPA's August 6, 1985 "Policy on Floodplains and Wetlands Assessments for CERCLA Actions." Specific measures to minimize adverse impacts may be identified following consultation with the appropriate agencies.

If the removal action selected for the Snowshoe Mine Site is found to potentially affect the floodplain, the following information will be produced: a Statement of Findings which will set forth the reasons why the proposed action must be located in or affect the floodplain; a description of significant facts considered in making the decisions to locate in or affect the floodplain or wetlands including alternative sites or actions; a statement indicating whether the selected action conforms to applicable state or local floodplain protection standards; a description of the steps to be taken to design or modify the proposed action to minimize the potential harm to or within the floodplain; and a statement indicating how the proposed action affects the natural or beneficial values of the floodplain.

c. Protection of Wetland Order (Relevant and Appropriate)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11, 990) mandates that federal agencies and potentially responsible parties (PRPs) avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. Section 404(b)(1), 33 U.S.C. § 1344(b)(1), also prohibits the discharge of dredged or fill material into waters of the United States. Together, these requirements create a "no net loss" of wetlands standard. If wetlands are found to be potentially affected by the Snowshoe Mine Site reclamation, this ARAR would be applicable.

d. The Endangered Species Act (Applicable)

This statute and implementing regulations (16 U.S.C. §§ 1531 – 1543, 50CFR Part 402, and 40 CFR § 6.302(h)) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify a critical habitat. The area around the Snowshoe Mine Site is known to harbor endangered and threatened species such as the Grizzly Bear, Lynx, Bald Eagle, Peregrine Falcon, and Grey Wolf.

Compliance with this requirement involves consultation with USFWS, and a determination of whether there are listed or proposed species or critical habitats present at the site, and, if so, whether any proposed activities will impact such wildlife or habitat.

e. The National Historic Preservation Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 470, 40 CFR § 6.310(b), 36 CFR Part 800) require federal agencies or federal projects to take into account the effect of any federally assisted undertaking or licensing on any district, site building, structure, or object that is included in, or eligible for, the Register of Historic Places. If effects cannot be avoided reasonably, measures should be implemented to minimize or mitigate the potential effect. In order to comply with this ARAR, the MDEQ/MWCB may consult with the State Historic Preservation Officer (SHPO), who can assist in identifying listed or eligible resources, and in assessing whether proposed cleanup actions will impact the resources and any appropriate mitigative measures.

f. Archaeological and Historic Preservation Act (Applicable)

The statute and implementing regulations (16 U.S.C. § 469, 40 CFR § 6.301(c)) establish requirements for evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of federal construction projects or a federally licensed activity or program. If eligible scientific, prehistoric, or archaeological artifacts are discovered during site activities, they must be preserved in accordance with these requirements.

g. Historic Sites, Buildings, and Antiquities Act (Applicable)

This requirement states that "in conducting an environmental review of a proposed action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR § 62.6(d) to avoid undesirable impacts upon such landmarks. The Programmatic Agreement activities described above should aid all parties in compliance with this ARAR.

h. Migratory Bird Treaty Act (Applicable)

This requirement (16 U.S.C. §§ 703 et seq.) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the USFWS during remedial design and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds. Specific mitigative measures may be identified for compliance with this requirement.

i. Bald Eagle Protection Act (Applicable)

This requirement (16 U.S.C. §§ 668 et seq.) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation with the USFWS during remedial design and remedial construction to ensure that any cleanup of the site does not unnecessarily adversely affect the bald and golden eagle. Specific mitigative measures may be identified for compliance with this requirement. The area including the Snowshoe Mine Site harbors the Bald Eagle.

j. Resource Conservation and Recovery Act (Relevant and Appropriate)

Any discrete waste units created or retained by the Snowshoe Mine Site cleanup must comply with the siting restrictions and conditions found at 40 CFR § 264.18(a) and (b). These sections require that waste repositories must not be located in seismic impact zones or in a 100 year flood plain. The repository planned for the Site is not indicated as being in a 100 year floodplain.

3. FEDERAL ACTION SPECIFIC REQUIREMENTS

a. Solid Waste (Applicable), Surface Mining Control and Reclamation (Applicable), and RCRA (Relevant and Appropriate) Requirements.

The contamination at the Snowshoe Mine Site Site is primarily mining waste form various man-made sources. This waste may not be RCRA hazardous waste, although EPA reserve its rights to make a more formal determination in this regard at a later date. For any management (i.e., treatment, storage, or disposal) or removal or retention of that contamination, the folowing requirements are ARARs.

1. Requirements described at 40 CFR §§ 257.3-1(a), 257.3-3, and257.3-4, governing waste handling, storage, and disposal, including retention of the waste, in general.[14]

2. For any discrete waste units which are addressed by the Snowshoe Mine Site cleanup, reclamation and closure regulations found at 30 CFR Parts 816 and 784,

[14] Solid Waste regulations are promulgated pursuant to the federal Solid Waste Disposal Act, as amended by the Resource Conversation and Recovery Act, 42 U.S.C. 6901 et seq. They are applicable regulations, although the State of Montana has the lead role in regulating solid waste disposal in the State of Montana. These regulations are also applicable to the hazardous waste described in the section above.

governing coal and to a lesser extent, non-coal mining, are applicable requirements.[15]

b. Air Standards – Clean Air Act (Applicable)

These Standards, promulgated pursuant to section 109 of the Clean Air Act,[16] are applicable to releases into the air from any Snowshoe Mine Site cleanup activities.

i. Lead: No person shall cause or contribute to concentrations of lead in the ambient air which exceed 1.5 micrograms per cubic meter ($\mu g/m^3$) of air, measured over a 90-day average.

These standards are promulgated at ARM 16.8.815 as part of a federally approved State Implementation Plan (SIP), pursuant to the Clean Air Act of Montana, §§ 75-2-101 et seq., MCA. Corresponding federal regulations are found at 40 CFR § 50.12.

ii. Particulate matter that is 10 microns in diameter or smaller (PM-10): No person shall cause of contribute to concentrations of PM-10 in the ambient air which exceed;

- 150 $\mu g/m^3$ 24 hour average, no mire than one expected exdeedance per calendar year;

- 50 $\mu g/m^3$ or air, annual average.

These regulations are promulgated at ARM 17.8.223 as part of a federally approved SIP, pursuant to the Clean Air Act of Montana, §§ 75-5-101 et seq., MCA. Corresponding federal regulations are found at 40 CFR § 50.6.

Ambient air standards under section 109 of the Clean Air Act are also promulgated for carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, and ozone. If emissions of these compounds were to occur at the site on connection with any cleanup action, these standards would also be applicable. See ARM 17.8.212 and 40 CFR Part 50.

c. Dredge and Fill Requirements (Applicable)

Regulations found at 40 CFR Part 230 address conditions or prohibitions against depositing dredge and fill material into water of the United States. If remediation activities would result in an activity subject to these regulations, they would be applicable.

d. Transportation of Hazardous or Contaminated Waste (Relevant and Appropriate)

[15] The Surface Mining Control and Reclamation Act is promulgated at 30 U.S.C. Sections 1201 – 1326.
[16] 42 U.S.C. §§ 7401 et. seq.

40 CFR Part 263 establishes regulations for the transportation of hazardous waste. These regulations would govern any on-site transportation of material. Any off-site transportation would be subject to applicable regulations.

STATE OF MONTANA ARARS

4. MONTANA CONTAMINANT SPECIFIC REQUIREMENT

a. Water Quality

i. Surface Water Quality Standards (Applicable)

Under the state Water Quality Act, §§ 75-5-101 et seq., MCA, the state has promulgated regulations to protect, maintain, and improve the quality of surface waters in the state. The requirements listed below are applicable water quality standards with which any remedial action must comply. The State of Montana has designated surface water in the area of the Snowshoe Mine Site classification B-1. Snowshoe Creek, which traverses the Site, is classified as B-1 but also is listed as impaired.

According to ARM 17.30.1310(3), MPDES permits are not necssary for any discharge that complies with the instructions of an on-scene coordinator pursuant to the MCP (40 CFR Part #)) et. Seq.). This exemption is identical to the federal exemption for NPDES permits. See 40 CFR section 122.3(d). The on-scene coordinator is the government official designated by the lead agency to coordinate and direct removal actions under the National Contingency Plan (NCP), subpart E. 40 CFR section 300.5. Removal actions include containment of hazardous substances form water and shorelines and taking other actions necessary to minimize or mitigate damage to public health or welfare or the environment. 40 CFR section 300.5. Removal also means cleaning up or removing hazardous substance releases from the environment, monitoring, assessing and evaluating releases or threats thereof, disposal of removed material, or other actions necessary to minimize or mitigate damage to public health or welfare or the environment. Id. Tom Mostad is the DEQ/MWCB Project Officer of this site and is overseeing the reclamation work. As the government official of the lead agency of a federally approved Abandoned Mine Program directing and coordinating this removal action, Tom Mostad is the on-scene coordinator. These activities are conducted pursuant to the NCP. Since this removal action will be conducted with the imprimatur of Tom Mostad, the on-scene coordinator, and be executed pursuant to his instructions, the expected discharges of water from the planned tailings impoundment will not require an MPDES permit.

For the primary contaminants of concern, the WQB-7 levels are listed below. WQB-7 (applicable) provides that "whenever both Aquatic Life Standards and Human Health Standards exist for the same analyte, the more restrictive of these values will be used as the numeric Surface Water Quality Standard."

Chemical	WQB-7 Standard (Surface Water)
Antimony	6 µg/l
Arsenic	18 µg/l
Cadmium	5 µg/l
Copper	1,300 µg/l
Lead	15 µg/l
Manganese	50 µg/l
Mercury	0.05 µg/l
Zinc	2,000 µg/l

Additional restrictions on any discharge to surface waters are included in:

ARM 17.30.637 (Applicable), which prohibits discharges containing substances that will:

(a) Settle to form objectionable sludge deposits or emulsions beneath the surface of the water upon adjoining shorelines;

(b) Create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;

(c) Produce odors, colors or other conditions which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;

(d) Create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life;

(e) Create conditions which produce undesirable aquatic life.

ii Groundwater Pollution Control System (Applicable)

In addition to the standards set forth below, relevant and appropriate MCLs and MCLGs are included in the federal ARARs identified above.

ARM 17.30.1002 (Applicable) classifies groundwater into Classes I through IV based on the present and future most beneficial uses of the groundwater, and states that groundwater is to be classified according to actual quality or actual use, whichever places the groundwater in a higher class. Class I is the highest quality class; class IV the lowest.

ARM 17.30.1003 (Applicable) establishes the groundwater quality standards applicable with respect to each groundwater classification. Concentrations of dissolved substances in Class I or II groundwater (or Class III groundwater which is used as a drinking water source) may not exceed the human health standards listed in department Circular WQB-7. For the primary contaminants of concern these levels are listed above.

Concentrations of other dissolved or suspended substances must not exceed levels that render the waters harmful, detrimental or injurious to public health. Maximum allowable concentration of these substances also must not exceed acute or chronic problem levels that would adversely affect existing or designated beneficial uses of groundwater of that classification. ARM 17.30.1003 specifies certain references that may be used as a guide in determining problem levels unless local conditions make these values inappropriate.

An additional concern with respect to ARARs for groundwater is the impact of groundwater upon the surface water. If significant loadings of contaminants form groundwater sources to surface water contribute to the inability of the stream to meet the classification standards, then alternatives to alleviate such groundwater loading must be evaluated and, if appropriate, implemented.

b. Air Quality

In addition to the standards identified in the federal action specific ARARs above, the State of Montana has identified certain air quality standards in the action-specific section of the State ARARs below.

5. MONTANA LOCATION SPECIFIC REQUIREMENTS

a. Solid Waste Management Regulations (Applicable)

Regulations promulgated under the Solid Waste Management Act, §§ 75-10-201 et seq., MCA, specify requirements that apply to the location of any solid waste management facility. Under ARM 17.50.505 (Applicable, a facility for the treatment, storage or disposal of solid wastes:

(a) must be located where a sufficient acreage of suitable land is available for solid waste management;
(b) may not be located in a 100-year floodplain;
(c) may be located only in areas which will prevent the pollution of ground and surface waters and public and private water supply systems;
(d) must be located to allow for reclamation and reuse of the land;
(e) drainage structures must be installed where necessary to prevent surface runoff from entering waste management areas; and
(f) where underlying geological formations contain rock fractures or fissures which may lead to pollution of the ground water or areas in which springs exist that are hydraulically connected to a proposed disposal facility, only Class III disposal facilities may be approved.

Even Class III landfills may not be located on the banks of or in a live or intermittent stream or water saturated areas, such as marshes or deep gravel pits which contain exposed ground water. ARM17.50.505(2)(j).

In addition, § 75-10-212 (Applicable) prohibits dumping or leaving any debris or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted. However, the restriction relating to privately owned property does not apply to the owner, his agents, or those disposing of debris or refuse with the owner's consent.

b. Natural streambed and Land Preservation Standards (Applicable)

Sections 87-5-502 and 504, MCA, (Applicable—substantive provisions only) provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any

construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing shape and form of any stream or its banks or tributaries I a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in approving remedial actions to be conducted.

ARM 36.2.404 (Applicable) establishes minimum standards which would be applicable if a remedial action alters or affects a streambed, including any channel change, new diversion, riprap or other streambank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development. No such project may be approved unless reasonable efforts will be made consistent with the purpose of the project to minimize the amount of stream channel alteration, insure that the project will be as permanent a solution as possible and will create a reasonably permanent and stable situation, insure that the project will pass anticipated water flows without creating harmful erosion upstream or downstream, minimize turbidity, effects on fish and aquatic habitat, and adverse effects on the natural beauty of the area and insure that streambed gravels will not be used in the project unless there is no reasonable alternative. Soils erosion and sedimentation must be kept to a minimum. Such projects must also protect the use of water for any useful or beneficial purpose. See § 75-7-102, MCA.

6. MONTANA ACTION SPECIFIC REQUIREMENTS

a. Air Quality

i. Air Quality Regulations (Applicable) Excavation/earth-moving transportation)

Dust suppression and control of certain substances likely to be released into the air as a result of earth moving, transportation and similar actions may be necessary to meet air quality requirements. Certain ambient air standards for specific contaminants and particulates are set forth in the federal action specific section above. Additional air quality regulations under the state Clean Air Act, §§ 75-2-101 et seq., MCA, are discussed below.

ARM 17.8.308 (1) and (2) and 17.8.304 (Applicable) provides that no person shall cause or authorize the production, handling, transportation or storage of any material; or cause or authorize the use of any street, road, or parking lot; or operate a construction site or demolition project, unless reasonable precautions to control emissions of airborne particulate matter are taken. Emissions of airborne articulate matter must be controlled so that they do not "exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes."

In addition, state law provides an ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. ARM 17.8.220 (Applicable).

ARM 17.8.308(4) (Applicable) requires that any new source of airborne particulate matter that has the potential to emit less than 100 tons per year of particulates shall apply best available control technology (BACT); any new source of airborne particulate matter that has the potential

to emit more than 100 tons per year of particulates shall apply lowest achievable emission rate (LAER). The BACT and LAER standards are defined in ARM 17.0.301.

ARM 26.4.761 (Applicable) specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities. Some of these measures could be considered relevant and appropriate to control fugitive dust emissions in connection with excavation, earth moving and transportation activities conducted as part of the remedy at the site. Such measures include, for example, paving, watering, chemically stabilizing, or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, restricting vehicle speeds, revegetating, mulching, or otherwise stabilizing the surface of areas adjoining roads, restricting unauthorized vehicle travel, minimizing the area of disturbed land, and promptly revegetating regraded lands.

b. Solid Waste Regulations

Solid Waste Management Regulations are applicable to the management of the tailings and similar wastes within this Site. Certain of these regulations are identified in the state Location Specific ARARs above. Other applicable requirements are discussed here.

ARM 17.50.505(2) (Applicable) specifies standards for solid waste management facilities, including the requirements that:

1. if there is the potential for leachate migration, it must be demonstrated that leachate will only migrate to underlying formations which have no hydraulic continuity with any state waters;
2. adequate separation of such wastes from underlying or adjacent water must be provided considering terrain, type of underlying soil formations, and facility design; and
3. no new disposal units or lateral expansions may be located in wetlands.

ARM 17.50.523 (Applicable) requires that such waste must be transported in such a manner as to prevent its discharge, dumping, spilling, or leaking from the transport vehicle.

Section 75-10-206, MCA, (Applicable) allows variances to be granted from solid waste regulations if failure to comply with the rules does not result in a danger to public health or safety or compliance with specific rules would produce hardship without producing benefits to the health and safety of the public that outweigh the hardship. In light of the nature if the wastes at issue and the likelihood that any repository would contain only a single type of waste, i.e. tailings and related materials, many of the Solid Waste Regulations regarding design of landfills, ARM 17.50.510-511, and landfill closure requirements and post-closure care, ARM 17.50.530-531, may appropriately be subject to variance in selecting and implementing a remedy at this Site.

c. Reclamation Requirements

i. Reclamation Activities – Hydrology Regulations (Applicable)
(Excavation, earth moving, altering drainage patterns)

The hydrology regulations promulgated under the Strip and Underground Mine Reclamation Act, §§ 82-4-201 et seq., MCA, provide detailed guidelines for addressing the hydrologic impacts of mine reclamation activities and earth moving projects and are applicable for addressing these impacts in the Snowshoe Mine Site.

ARM 26.4.631 (Applicable) provides that long-term adverse changes in the hydrologic balance from mining and reclamation activities, such as changes in water quality and quantity, and location of surface water drainage channels shall be minimized. Water pollution must be minimized and, where necessary, treatment methods utilized. Diversions of drainages to avoid contamination must be used in preference to the use of water treatment facilities. Other pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming, and toxic-forming waste materials.

ARM 26.4.633 (Applicable) states that all surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). Treatment must continue until the area is stabilized.

ARM 26.4.634 (Applicable) provides that, in reclamation of drainages, drainage design must emphasize channel and floodplain dimensions that approximate the pre-mining configuration and that will blend with the undisturbed drainage above and below the area to be reclaimed. The average stream gradient must be maintained with a concave longitudinal profile. This regulation provides specific requirements for designing the reclaimed drainage to:

1. meander naturally;
2. remain in dynamic equilibrium with the system;
3. improve unstable pre-mining conditions;
4. provide for floods; and
5. establish a pre-mining diversity of aquatic habitats and riparian vegetation.

ARM 26.4.635 through 26.4.637 (Applicable) set forth requirements for temporary and permanent diversions.

ARM 26.4.640 (Applicable) provides that discharge from sedimentation ponds, permanent and temporary impoundments, and diversions shall be controlled by energy dissipaters, riprap channels, and other devices, where necessary, to reduce erosion, prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance.

ii. Reclamation and Revegetation Requirements (Applicable) (Excavation)

ARM 26.4.501 and 501A (Applicable) give general back-filling and final grading requirements.

ARM 26.4.504 (Applicable) provides that permanent impoundments that meet the requirements of ARM 26.4.642 may be retained in mined and reclaimed sites, provided that all highwalls are eliminated by grading to appropriate contours and the post-mining land use and protection of

hydrologic balance provisions are satisfied. No impoundments may be constructed on top of areas in which excess materials are deposited.

ARM 26.4.514 (Applicable) sets out contouring requirements.

ARM 26.4.519 (Applicable) provides that an operator may be required to monitor settling of regraded areas.

ARM 26.4.520 (Applicable) provides that spoil material may be placed in a controlled (engineered) manner in a disposal area other than the mine workings or excavations. Also provides various other relevant requirements, including, but not limited to, those for water protection i.e., that leachate and surface runoff from the fill must not degrade surface or ground waters or exceed effluent limitations.

ARM 26.4.638 (Applicable) specifies sediment control measures to be implemented during operations.

ARM 26.4.641 (Applicable) provides that drainage from acid-and toxic-forming spoil ground and surface water must be avoided by several enumerated means, all of which are relevant.

ARM 26.4.642 (Applicable) prohibits permanent impoundments except under certain circumstances. Also provides other construction requirements for embankments, dams and diversion ditches.

ARM 26.4.643-646 (Applicable) provides for protection of groundwater and groundwater recharge, and provides requirements for monitoring surface and groundwater.

ARM 26.4.650 (Applicable) provides for post-mining rehabilitation of sedimentation ponds, diversion, impoundments and treatment facilities before abandonment of the permit area.

ARM 26.4.702 (Applicable) requires that during the redistributing and stockpiling of soil (for reclamation):

1. regraded areas must be deep-tilled, sub-soiled, or otherwise treated to eliminate any possible slippage potential, to relieve compaction, and to promote root penetration and permeability of the underlying layer; this preparation must be done on the contour whenever possible and to a minimum depth of 12 inches;
2. redistribution must be done in a manner that achieves approximate uniform thicknesses consistent with soil resource availability and appropriate for the post-mining vegetation, land uses, contours, and surface water drainage systems; and
3. redistributed soil mist be reconditioned by sub-soiling or other appropriate methods.

ARM 26.4.703 (Applicable) When using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use, and (2) the medium must be the best available in the area to support vegetation. Such substitutes mist be used in a manner consistent with the requirements for redistribution of soil in arm 26.4.701 and 702.

Are 26.4.711 (Applicable) requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety native to the area of land to be affected shall be established except on road surfaces and below the low-water line of permanent impoundments. Vegetative cover is considered of the same seasonal variety if it consists of a mixture of species of equal or superior utility when compared with the natural (or pre-existing) vegetation during each season of the year. (See also ARM 26.4.716 below regarding substitution of introduced species for native species.)

ARM 26.4.713 (Applicable) provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed preparation but may not be more than 90 days after soil has been replaced.

ARM 26.4.714 (Applicable) requires use of a mulch or cover crop or both until an adequate permanent cover can be established. Use of mulching and temporary cover may be suspended under certain conditions.

ARM 26.4.716 (Applicable) establishes the required method of revegetation, and provides that introduced species may be substituted for native species as part of an approved plan.

ARM 26.4.718 (Applicable) requires the use of soil amendments and other means such as irrigation, management, fencing, or other measures, if necessary to establish a diverse and permanent vegetative cover.

ARM 26.4.720 (Applicable) requires annual state inspection of seeded areas.

ARM 26.4.721 (Applicable) requires rills and gullies forming in areas that have been regraded or resoiled must be filled, graded or otherwise stabilized and the area reseeded or replanted under certain circumstances.

ARM 26.4.723 (Applicable) requires periodic monitoring and data review of vegetation, soils, wildlife and other items at the site by the operator as prescribed or approved by the state.

ARM 26.4.724 (Applicable) provides revegetation comparison standards.

ARM 26.4.725 (Applicable) establishes commencement of the minimum period of responsibility for reestablishing vegetation.

ARM 26.4.726 (Applicable) establishes vegetation production, cover, diversity, density and utility requirements for revegetation and reclamation success.

ARM 26.4.728 (Applicable) sets forth requirements for the composition of vegetation on reclaimed areas.

ARM 26.4.730-731 (Applicable) requires season of use standards and analysis of toxicity if such toxicity is suspected due to the effects of disturbance caused by the reclamation technique.

7. OTHER LAWS (NON-EXCLUSIVE LIST)

CERCLA defines as ARARs only federal environmental and state environmental and siting laws. Remedial design, implementation, and operation and maintenance must nevertheless comply with all other applicable laws, both state and federal, if the remediation work is done by parties other than the federal government or its contractors.

The following "other laws" are included here to provide a reminder of other legally applicable requirements for actions being conducted at the Snowshoe Mine Site. They do not purport to be an exhaustive list of such legal requirements, but are included because they set out related concerns that must be addressed and, in some cases, may require some advance planning. They are not included as ARARs because they are not "environmental or facility siting laws." As applicable laws other than ARARs, they are not subject to ARARs waiver provisions.

Section 121(e) of CERCLA exempts removal or remedial actions conducted entirely on-site from federal, state, or local permits. This exemption is not limited to environmental or facility siting laws, but applies to other permit requirements as well.

a. Other Federal Laws

i. Occupational Safety and Health Regulations

The federal Occupational Safety and Health Act regulations found at 29 CFR § 1910 are applicable to worker protection during conduct of RI/FS or remedial activities.

b. Other Montana Laws

i. Water Rights

Section 85-2-101, MCA, declares that all waters within the state are the state's property, and may be appropriated for beneficial uses. The wise use of water resources is encouraged for the maximum benefit to the people and with minimum degradation of natural aquatic ecosystems.

Parts 3 and 4 of Title 85, MCA, set out requirements for obtaining water rights and appropriating and utilizing water. All requirements of these parts are laws, which must be complied with in any action using or affecting waters of the state. Some of the specific requirements are set forth below.

Section 85-2-302, MCA, specifies that a person may not appropriate water or commence construction of diversion, impoundment, withdrawal or distribution works therefor except by applying for and receiving a permit from the Montana Department of Natural Resources and Conservation. While the permit itself may not be required under federal law, appropriate notification and submission of an application should be performed and a permit should be applied for in order to establish a priority date in the prior appropriation system. A 1991 amendment imposes a fee of $1.00 per acre foot for appropriations of ground water, effective until July 1, 1993.

ii. Occupational Health Act, §§ 50-70-101 et seq., MCA.

ARM 17.74.101 addresses occupational noise. In accordance with this section, no worker shall be exposed to noise levels in excess of the levels specified in this regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR § 1910.95 applies.

ARM 17.74.102 addressed occupational air contaminants. The purpose of this rule is to establish maximum threshold limit values for air contaminants under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. In accordance with this rule, no worker shall be exposed to air contaminant levels in excess of the threshold limit values listed in the regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR § 1910.1000 applies.

iii. Montana Safety Act

Sections 50-71-201,202 and 203, MCA, state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. The employer must also do every other thing reasonably necessary to protect the life and safety of its employees. Employees are prohibited from refusing to use or interfering with the use of safety devices.

iv. Employee and Community Hazardous Chemical Information Act

Sections 50-78-201, 202, and 204, MCA, state that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.

APPENDIX D

RECLAMATION ALTERNATIVES COST ESTIMATES

TABLE D-1: SNOWSHOE MINE SITE ALTERNATIVE 3A
IN-PLACE CONTAINMENT OF SELECT WASTE SOURCES

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$53,932.75	$53,932.75
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$7,500.00	$7,500.00
WR4 Grading	2.9	acre	$5,000.00	$14,500.00
Tailings Grading	7.3	acre	$3,000.00	$21,900.00
Lime Application	1,040	ton	$85.00	$88,400.00
Clear and Grub Borrow Area	3.5	acre	$6,000.00	$21,000.00
Excavate/Stockpile Borrow Area Topsoil	4,120	C.Y.	$2.00	$8,240.00
Excavate Borrow Area Subsoil, Haul, and Apply to Regraded Waste Sources (1.0 ft. depth)	16,500	C.Y.	$6.00	$99,000.00
Organic Amendment	1,285	Dry Ton	$105.00	$134,925.00
Install Erosion Control Mat Over WR4	14,050	S.Y.	$2.75	$38,637.50
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Fertilize and Seed	10.1	acre	$1,000.00	$10,100.00
Mulch	10.1	acre	$1,000.00	$10,100.00
Reclaim Borrow Area (Finish Grade, Apply Salvaged Topsoil, Fertilize, Seed, and Mulch)	2.55	acre	$3,500.00	$8,925.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	2,000	L.F.	$3.00	$6,000.00
Install Fences Surrounding Reclaimed Areas	7,200	L.F.	$3.00	$21,600.00
Subtotal				$593,260.25
Contingency (10%)				$59,326.03
TOTAL ESTIMATED COST				**$652,586.28**

TABLE D-2: SNOWSHOE MINE SITE ALTERNATIVE 3B
IN-PLACE CONTAINMENT OF ALL WASTE SOURCES

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$73,417.75	$73,417.75
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$7,500.00	$7,500.00
Construct Road to Upper WR Dumps (600 ft. Vertical Elevation Difference)	4,900	L.F.	$17.50	$85,750.00
WR1, WR2 & WR3 Grading	0.64	acre	$20,000.00	$12,800.00
WR4 Grading	2.9	acre	$5,000.00	$14,500.00
Tailings Grading	7.3	acre	$3,000.00	$21,900.00
Lime Application	1,073	ton	$90.00	$96,570.00
Clear and Grub Borrow Area	4	acre	$6,000.00	$24,000.00
Excavate/Stockpile Borrow Area Topsoil	4,360	C.Y.	$2.00	$8,720.00
Excavate Borrow Area Subsoil, Haul, and Apply to Regraded Waste Sources (1.0 ft. depth)	17,500	C.Y.	$7.00	$122,500.00
Organic Amendment	1,365	Dry Ton	$105.00	$143,325.00
Install Erosion Control Mat on Waste Rock Dumps	17,150	S.Y.	$2.75	$47,162.50
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Obliterate/Reclaim Road to Upper WR Dumps	1	L.S.	$32,000.00	$32,000.00
Fertilize and Seed (Includes Haul Road)	14.3	acre	$1,000.00	$14,300.00
Mulch (Includes Haul Road)	14.3	acre	$1,000.00	$14,300.00
Reclaim Borrow Area (Finish Grade, Apply Salvaged Topsoil, Fertilize, Seed, and Mulch)	2.7	acre	$3,500.00	$9,450.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	2,500	L.F.	$3.00	$7,500.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$807,595.25
Contingency (10%)				$80,759.53
TOTAL ESTIMATED COST				**$888,354.78**

TABLE D-3: SNOWSHOE MINE SITE ALTERNATIVE 4A
REMOVAL/DISPOSAL OF TAILINGS IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF WASTE ROCK DUMP NO. 4
(Alternative 4A-1 - Repository with Cover Soil Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$136,138.75	$136,138.75
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Clear and Grub Repository Area	4	acre	$6,000.00	$24,000.00
Excavate Repository and Stockpile Soil	27,800	C.Y.	$1.50	$41,700.00
WR4 Grading	2.9	acre	$5,000.00	$14,500.00
Lime Application	690	ton	$85.00	$58,650.00
Cover Soil Application to WR4	4,700	C.Y.	$4.00	$18,800.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Tailings Excavation/Loadout/Haul to Repository	97,000	C.Y.	$6.50	$630,500.00
Cover Soil Application to Tailings Excavation Footprint	11,800	C.Y.	$4.00	$47,200.00
Stream Reconstruction	2,000	L.F.	$30.00	$60,000.00
Install Repository Cover Soil	11,300	C.Y.	$1.50	$16,950.00
Organic Amendment	2,170	Dry Ton	$105.00	$227,850.00
Install Erosion Control Mat Over WR4	14,050	S.Y.	$2.75	$38,637.50
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Fertilize and Seed	13.6	acre	$1,000.00	$13,600.00
Mulch	13.6	acre	$1,000.00	$13,600.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	2,500	L.F.	$3.00	$7,500.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00

TABLE D-3: SNOWSHOE MINE SITE ALTERNATIVE 4A
REMOVAL/DISPOSAL OF TAILINGS IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF WASTE ROCK DUMP NO. 4
(Alternative 4A-1 - Repository with Cover Soil Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Subtotal				$1,497,526.25
Contingency (10%)				$149,752.63
TOTAL ESTIMATED COST				**$1,647,278.88**

TABLE D-4: SNOWSHOE MINE SITE ALTERNATIVE 4A
REMOVAL/DISPOSAL OF TAILINGS IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF WASTE ROCK DUMP NO. 4
(Alternative 4A-2 - Repository with Multi-Layered Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$152,231.75	$152,231.75
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Clear and Grub Repository Area	4	acre	$6,000.00	$24,000.00
Excavate Repository and Stockpile Soil	27,800	C.Y.	$1.50	$41,700.00
WR4 Grading	2.9	acre	$5,000.00	$14,500.00
Lime Application	690	ton	$85.00	$58,650.00
Cover Soil Application to WR4	4,700	C.Y.	$4.00	$18,800.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Tailings Excavation/Loadout/Haul to Repository	97,000	C.Y.	$6.50	$630,500.00
Cover Soil Application to Tailings Excavation Footprint	11,800	C.Y.	$4.00	$47,200.00
Stream Reconstruction	2,000	L.F.	$30.00	$60,000.00
Repository Cap Subgrade Preparation	16,940	S.Y.	$0.50	$8,470.00
Install Geocushion	16,940	S.Y.	$1.00	$16,940.00
Install PVC Geomembrane Cap Liner	16,940	S.Y.	$3.50	$59,290.00
Install Geocomposite Drainage Layer	16,940	S.Y.	$4.50	$76,230.00
Install Repository Cover Soil	11,300	C.Y.	$1.50	$16,950.00
Organic Amendment	2,170	Dry Ton	$105.00	$227,850.00
Install Erosion Control Mat Over WR4	14,050	S.Y.	$2.75	$38,637.50
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Fertilize and Seed	13.6	acre	$1,000.00	$13,600.00
Mulch	13.6	acre	$1,000.00	$13,600.00

TABLE D-4: SNOWSHOE MINE SITE ALTERNATIVE 4A
REMOVAL/DISPOSAL OF TAILINGS IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF WASTE ROCK DUMP NO. 4
(Alternative 4A-2 - Repository with Multi-Layered Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Construct Runon Control Ditches	2,500	L.F.	$3.00	$7,500.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$1,674,549.25
Contingency (10%)				$167,454.93
TOTAL ESTIMATED COST				**$1,842,004.18**

TABLE D-5: SNOWSHOE MINE SITE ALTERNATIVE 4A
REMOVAL/DISPOSAL OF TAILINGS IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF WASTE ROCK DUMP NO. 4
(Alternative 4A-3 - Repository with Bottom Liner, Leachate Collection System and Lined Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$170,824.75	$170,824.75
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Clear and Grub Repository Area	4	acre	$6,000.00	$24,000.00
Excavate Repository and Stockpile Soil	27,800	C.Y.	$1.50	$41,700.00
Repository Subgrade Preparation	16,940	S.Y.	$0.50	$8,470.00
Install Geocushion	16,940	S.Y.	$1.00	$16,940.00
Install PVC Geomembrane Liner	16,940	S.Y.	$3.50	$59,290.00
Install Geocomposite Drainage Layer	16,940	S.Y.	$4.50	$76,230.00
Install Leachate Collection System	1	L.S.	$25,000.00	$25,000.00
WR4 Grading	2.9	acre	$5,000.00	$14,500.00
Lime Application	690	ton	$85.00	$58,650.00
Cover Soil Application to WR4	4,700	C.Y.	$4.00	$18,800.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Tailings Excavation/Loadout/Haul to Repository	97,000	C.Y.	$6.50	$630,500.00
Cover Soil Application to Tailings Excavation Footprint	11,800	C.Y.	$4.00	$47,200.00
Stream Reconstruction	2,000	L.F.	$30.00	$60,000.00
Repository Cap Subgrade Preparation	16,940	S.Y.	$0.50	$8,470.00
Install Geocushion	16,940	S.Y.	$1.00	$16,940.00
Install PVC Geomembrane Cap Liner	16,940	S.Y.	$3.50	$59,290.00

TABLE D-5: SNOWSHOE MINE SITE ALTERNATIVE 4A
REMOVAL/DISPOSAL OF TAILINGS IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF WASTE ROCK DUMP NO. 4
(Alternative 4A-3 - Repository with Bottom Liner, Leachate Collection System and Lined Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Install Geocomposite Drainage Layer	16,940	S.Y.	$4.50	$76,230.00
Install Repository Cover Soil	11,300	C.Y.	$1.50	$16,950.00
Organic Amendment	2,170	Dry Ton	$105.00	$227,850.00
Install Erosion Control Mat Over WR4	14,050	S.Y.	$2.75	$38,637.50
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Fertilize and Seed	13.6	acre	$1,000.00	$13,600.00
Mulch	13.6	acre	$1,000.00	$13,600.00
Construct Runon Control Ditches	2,500	L.F.	$3.00	$7,500.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$1,879,072.25
Contingency (10%)				$187,907.23
TOTAL ESTIMATED COST				**$2,066,979.48**

TABLE D-6: SNOWSHOE MINE SITE ALTERNATIVE 4B
REMOVAL/DISPOSAL OF SELECT WASTE SOURCES IN A CONSTRUCTED REPOSITORY
AND IN-PLACE CONTAINMENT OF REMAINING WASTE SOURCES
(Alternative 4B-1 - Repository with Cover Soil Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$171,396.25	$171,396.25
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Construct Road to Upper WR Dumps (600 ft. Vertical Elevation Difference)	4,900	L.F.	$17.50	$85,750.00
WR1, WR2 & WR3 Grading	0.64	acre	$20,000.00	$12,800.00
Lime Application	33	ton	$175.00	$5,775.00
Clear and Grub Repository Area	5.5	acre	$6,000.00	$33,000.00
Excavate Repository and Stockpile Soil	32,200	C.Y.	$1.50	$48,300.00
WR4 Excavation/Loadout/Haul to Repository	37,500	C.Y.	$5.50	$206,250.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Tailings Excavation/Loadout/Haul to Repository	97,000	C.Y.	$6.50	$630,500.00
Cover Soil Application to WR1, WR2, & WR3	1,050	C.Y.	$7.50	$7,875.00
Install Erosion Control Mat Over Waste Rock Areas	17,150	S.Y.	$2.75	$47,162.50
Cover Soil Application to WR4 and Tailings Excavation Footprints	15,500	C.Y.	$4.00	$62,000.00
Stream Reconstruction	2,000	L.F.	$30.00	$60,000.00
Install Repository Cover Soil	15,900	C.Y.	$1.50	$23,850.00
Organic Amendment	2,520	Dry Ton	$105.00	$264,600.00
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Obliterate/Reclaim Road to Upper WR Dumps	1	L.S.	$32,000.00	$32,000.00
Fertilize and Seed (Includes Haul Road)	18.6	acre	$1,000.00	$18,600.00
Mulch (Includes Haul Road)	18.6	acre	$1,000.00	$18,600.00

TABLE D-6: SNOWSHOE MINE SITE ALTERNATIVE 4B
REMOVAL/DISPOSAL OF SELECT WASTE SOURCES IN A CONSTRUCTED REPOSITORY AND IN-PLACE CONTAINMENT OF REMAINING WASTE SOURCES
(Alternative 4B-1 - Repository with Cover Soil Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	3,000	L.F.	$3.00	$9,000.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$1,885,358.75
Contingency (10%)				$188,535.88
TOTAL ESTIMATED COST				**$2,073,894.63**

TABLE D-7: SNOWSHOE MINE SITE ALTERNATIVE 4B
REMOVAL/DISPOSAL OF SELECT WASTE SOURCES IN A CONSTRUCTED REPOSITORY AND IN-PLACE CONTAINMENT OF REMAINING WASTE SOURCES
(Alternative 4B-2 - Repository with Multi-Layered Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$193,958.75	$193,958.75
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Construct Road to Upper WR Dumps (600 ft. Vertical Elevation Difference)	4,900	L.F.	$17.50	$85,750.00
WR1, WR2 & WR3 Grading	0.64	acre	$20,000.00	$12,800.00
Lime Application	33	ton	$175.00	$5,775.00
Clear and Grub Repository Area	5.5	acre	$6,000.00	$33,000.00
Excavate Repository and Stockpile Soil	32,200	C.Y.	$1.50	$48,300.00
WR4 Excavation/Loadout/Haul to Repository	37,500	C.Y.	$5.50	$206,250.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Tailings Excavation/Loadout/Haul to Repository	97,000	C.Y.	$6.50	$630,500.00
Repository Cap Subgrade Preparation	23,750	S.Y.	$0.50	$11,875.00
Install Geocushion	23,750	S.Y.	$1.00	$23,750.00
Install PVC Geomembrane Cap Liner	23,750	S.Y.	$3.50	$83,125.00
Install Geocomposite Drainage Layer	23,750	S.Y.	$4.50	$106,875.00
Cover Soil Application to WR1, WR2, & WR3	1,050	C.Y.	$7.50	$7,875.00
Install Erosion Control Mat Over Waste Rock Areas	17,150	S.Y.	$2.75	$47,162.50
Cover Soil Application to WR4 and Tailings Excavation Footprints	15,500	C.Y.	$4.00	$62,000.00
Stream Reconstruction	2,000	L.F.	$30.00	$60,000.00
Install Repository Cover Soil	15,900	C.Y.	$1.50	$23,850.00

TABLE D-7: SNOWSHOE MINE SITE ALTERNATIVE 4B
REMOVAL/DISPOSAL OF SELECT WASTE SOURCES IN A CONSTRUCTED REPOSITORY AND IN-PLACE CONTAINMENT OF REMAINING WASTE SOURCES
(Alternative 4B-2 - Repository with Multi-Layered Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Organic Amendment	2,520	Dry Ton	$105.00	$264,600.00
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Obliterate Road to Upper WR Dumps	1	L.S.	$32,000.00	$32,000.00
Fertilize and Seed (Includes Haul Road)	18.6	acre	$1,000.00	$18,600.00
Mulch (Includes Haul Road)	18.6	acre	$1,000.00	$18,600.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	3,000	L.F.	$3.00	$9,000.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$2,133,546.25
Contingency (10%)				$213,354.63
TOTAL ESTIMATED COST				**$2,346,900.88**

TABLE D-8: SNOWSHOE MINE SITE ALTERNATIVE 4B
REMOVAL/DISPOSAL OF SELECT WASTE SOURCES IN A CONSTRUCTED REPOSITORY AND IN-PLACE CONTAINMENT OF REMAINING WASTE SOURCES
(Alternative 4B-3 - Repository with Bottom Liner, Leachate Collection System and Lined Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$220,021.25	$220,021.25
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$5,000.00	$15,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Construct Road to Upper WR Dumps (600 ft. Vertical Elevation Difference)	4,900	L.F.	$17.50	$85,750.00
WR1, WR2 & WR3 Grading	0.64	acre	$20,000.00	$12,800.00
Lime Application	33	ton	$175.00	$5,775.00
Clear and Grub Repository Area	5.5	acre	$6,000.00	$33,000.00
Excavate Repository and Stockpile Soil	32,200	C.Y.	$1.50	$48,300.00
Repository Subgrade Preparation	23,750	S.Y.	$0.50	$11,875.00
Install Geocushion	23,750	S.Y.	$1.00	$23,750.00
Install PVC Geomembrane Liner	23,750	S.Y.	$3.50	$83,125.00
Install Geocomposite Drainage Layer	23,750	S.Y.	$4.50	$106,875.00
Install Leachate Collection System	1	L.S.	$35,000.00	$35,000.00
WR4 Excavation/Loadout/Haul to Repository	37,500	C.Y.	$5.50	$206,250.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Tailings Excavation/Loadout/Haul to Repository	97,000	C.Y.	$6.50	$630,500.00
Repository Cap Subgrade Preparation	23,750	S.Y.	$0.50	$11,875.00
Install Geocushion	23,750	S.Y.	$1.00	$23,750.00
Install PVC Geomembrane Cap Liner	23,750	S.Y.	$3.50	$83,125.00
Install Geocomposite Drainage Layer	23,750	S.Y.	$4.50	$106,875.00

TABLE D-8: SNOWSHOE MINE SITE ALTERNATIVE 4B
REMOVAL/DISPOSAL OF SELECT WASTE SOURCES IN A CONSTRUCTED REPOSITORY AND IN-PLACE CONTAINMENT OF REMAINING WASTE SOURCES
(Alternative 4B-3 - Repository with Bottom Liner, Leachate Collection System and Lined Cap)

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Cover Soil Application to WR1, WR2, & WR3	1,050	C.Y.	$7.50	$7,875.00
Install Erosion Control Mat Over Waste Rock Areas	17,150	S.Y.	$2.75	$47,162.50
Cover Soil Application to WR4 and Tailings Excavation Footprints	15,500	C.Y.	$4.00	$62,000.00
Stream Reconstruction	2,000	L.F.	$30.00	$60,000.00
Install Repository Cover Soil	15,900	C.Y.	$1.50	$23,850.00
Organic Amendment	2,520	Dry Ton	$105.00	$264,600.00
Hard Armor Eastern Perimeter of WR4 (Rock Mulch)	1	L.S.	$7,500.00	$7,500.00
Obliterate Road to Upper WR Dumps	1	L.S.	$32,000.00	$32,000.00
Fertilize and Seed (Includes Haul Road)	18.6	acre	$1,000.00	$18,600.00
Mulch (Includes Haul Road)	18.6	acre	$1,000.00	$18,600.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	3,000	L.F.	$3.00	$9,000.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$2,420,233.75
Contingency (10%)				$242,023.38
TOTAL ESTIMATED COST				**$2,662,257.13**

TABLE D-9: SNOWSHOE MINE SITE ALTERNATIVE 5
REMOVAL/DISPOSAL OF ALL WASTE SOURCES
AT AN OFF-SITE DISPOSAL FACILITY

COST ITEM	QUANTITY	UNITS	UNIT PRICE	COST
Mobilization, Bonding & Insurance	1	L.S.	$3,198,497.85	$3,198,497.85
Road Improvement & Maintenance Throughout Project (Including Traffic Control)	3	mile	$15,000.00	$45,000.00
Install Temporary Construction Bridge Across Snowshoe Creek	1	L.S.	$20,000.00	$20,000.00
Install Construction BMPs	1	L.S.	$10,000.00	$10,000.00
Construct Road to Upper WR Dumps (600 ft. Vertical Elevation Difference)	4,900	L.F.	$17.54	$85,946.00
Clear and Grub Borrow Area	4	acre	$6,000.00	$24,000.00
Excavate/Stockpile Borrow Area Topsoil	4,360	C.Y.	$2.00	$8,720.00
Temporary Stream Diversion	1	L.S.	$31,000.00	$31,000.00
Tailings Dewatering	1	L.S.	$35,000.00	$35,000.00
Excavate/Tansport Wastes to Disposal Facility	138,500	C.Y.	$46.50	$6,440,250.00
Waste Treatment & Disposal Fees (including Tax)	138,500	C.Y.	$180.00	$24,930,000.00
Excavate Borrow Area Subsoil, Haul, and Apply to Excavated Waste Footprints (1.0 ft. depth)	16,500	C.Y.	$6.00	$99,000.00
Organic Amendment	1,290	Dry Ton	$105.00	$135,450.00
Install Erosion Control Mat Over Waste Rock Dump Areas	17,150	S.Y.	$2.75	$47,162.50
Fertilize and Seed (Includes Haul Road)	14.3	acre	$1,000.00	$14,300.00
Mulch (Includes Haul Road)	14.3	acre	$1,000.00	$14,300.00
Reclaim Borrow Area (Finish Grade, Apply Salvaged Topsoil, Fertilize, Seed, and Mulch)	2.7	acre	$3,500.00	$9,450.00
Install Bat-Friendly Adit Closures	2	each	$3,000.00	$6,000.00
Construct Runon Control Ditches	2,000	L.F.	$3.00	$6,000.00
Install Fences Surrounding Reclaimed Areas	7,800	L.F.	$3.00	$23,400.00
Subtotal				$35,183,476.35
Contingency (10%)				$3,518,347.64
TOTAL ESTIMATED COST				**$38,701,823.99**